NETWORK WORLD

The Newsweekly of User Networking Strategies | Volume 6, Number 3 | Jan. 23, 1989

Top AT&T executive talks tough

By Anita Taff
Senior Correspondent, Washington

WASHINGTON, D.C. — A top AT&T official last week vowed to raise the stakes in the long-haul market battle this year, saying the company may file for as many as 200 Tariff 12 custom network deals to keep big customers in the fold.

Joseph Nacchio, vice-president of business services in AT&T's Business Markets Group, said at a press briefing here that his company is being severely hampered by regulations that affect only AT&T. Nacchio estimated that regulatory delays cost the company $100 million in lost corporate accounts last year.

AT&T will move vigorously this year "to work the processes that regulate this industry" for greater market freedom, Nacchio said.

A high priority for AT&T is to secure the passage of price cap regulation, which would give the company some added pricing flexibility.

The carrier may also seek to revisit the Federal Communications Commission decision that designated AT&T as a dominant carrier, thereby requiring it to file public tariffs. "We're going to

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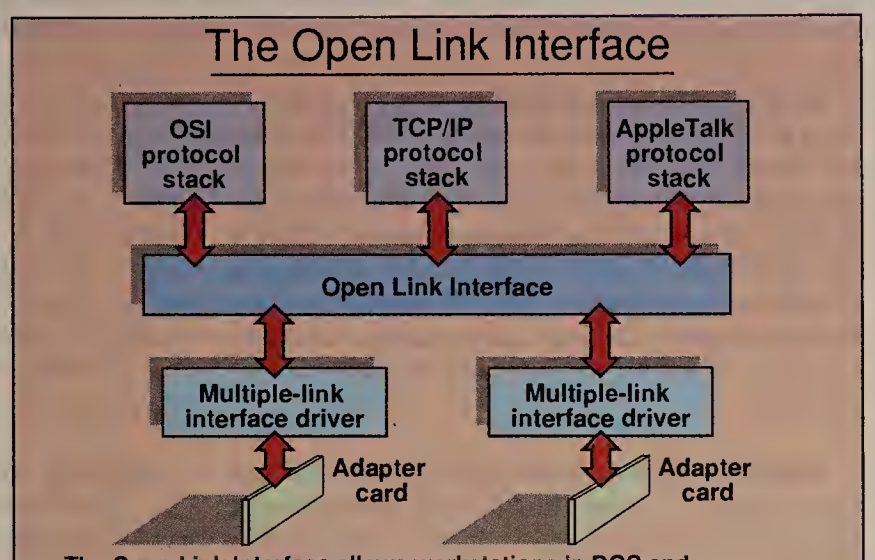

The Open Link Interface allows workstations in DOS and OS/2 LANs to use multiple adapter cards and network protocols.

GRAPHIC BY SUSAN J. CHAMPENY — SOURCE: NOVELL, INC., PROVO, UTAH

X.400 poised on the brink of broad user acceptance

Users expected to employ new products and services to widen reach of electronic mail nets.

By Barton Crockett
Senior Editor

Use of the X.400 messaging system in the U.S. could take off in the next few years as users and vendors take advantage of the technology to interconnect proprietary electronic mail nets.

Part of the Open Systems Interconnection model, X.400 specifies a standard method for sending messages between computers on a store-and-forward basis. Today, most major computer manufacturers and public E-mail providers are beginning to offer X.400 gateways that let users send messages between private E-mail systems or through public E-mail networks (see chart on page 6). Such gateways were virtually unheard of just two years ago.

Users and analysts say there is great pent-up demand for tools, such as X.400 gateways, that let users exchange messages among different E-mail systems.

"Businesses have a clear need to send messages to one another through E-mail," said Peter Donaghy, manager of user service and support at Hughes Aircraft Co. in Westchester, Calif. "Com-

(continued on page 6)

Novell, Apple pitch open protocol link

Open Link Interface lets PC users communicate using several network protocols simultaneously.

By Susan Breidenbach
West Coast Bureau Chief

SUNNYVALE, Calif. — Novell, Inc. and Apple Computer, Inc. last week announced a software interface that lets OS/2 and MS-DOS workstations more easily support a mix of net protocols.

The two companies unveiled the Open Link Interface (OLI) at MacWorld Expo here, where 17 other vendors, including Compaq Computer Corp., Interlan, Inc., Sytek, Inc., Western Digital Corp. and The Wollongong Group, Inc., pledged support for the interface.

Some analysts described the introduction of OLI as a competitive response by Novell to the Network Device Interface and Protocol Manager features that form the framework of the open-protocol architecture of Microsoft Corp.'s OS/2 LAN Manager.

OLI will help vendors of communications software and local network adapter cards develop products that let OS/2 and DOS workstations communicate using several networking protocols simultaneously.

The OLI software provides an interface between adapter cards and protocol stacks. It lets vendors offer adapter cards that work with a variety of protocols without having to support numerous device drivers. Currently, a board manufacturer that wants a product to operate in a variety of networking environments must write multiple drivers for it.

OLI handles as many as 32 transport protocols and 16 differ-

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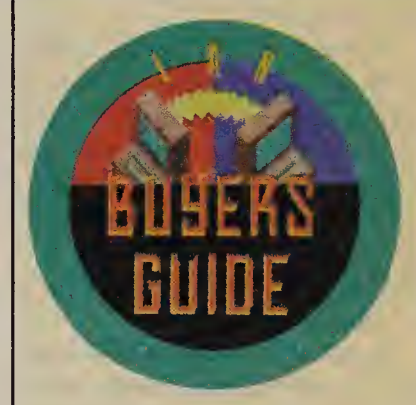

Micro-to-host Buyer's Guide, page 39.

NET readies expert net control tool

By John Cox
Senior Editor

REDWOOD CITY, Calif. — Network Equipment Technologies, Inc. (NET) is readying workstation-based software that employs expert system technology to simplify management of nets based on the company's T-1 multiplexers, *Network World* has learned.

The expert system software reportedly will monitor and diagnose network problems, as well as help resolve them.

Observers, including NET co-founder Roger Chrisman, said NET and other T-1 vendors are trying to give users a new generation of tools with which to manage increasingly complex networks. An expert system net management package would speed problem detection and resolution, and make it easier to predict network failures.

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NETLINE

NEW LAN WARES THREATEN makers of traditional data base computers. Page 2.

MCI CUTS E-MAIL service prices by up to 75%. Page 2.

HP IS SET TO unveil its OS/2-based LAN Manager offering and interface cards for twisted-pair Ethernets. Page 4.

A T-1 NET CONTROL system will debut this week from Clear Communications. Page 4.

US SPRINT FOLLOWS AT&T's lead in cutting T-1 service prices. Page 6.

NYNEX ROLLS OUT interface specs for a packet-switch service that links local nets. Page 7.

BELL ATLANTIC GETS the nod from the GSA for a private ISDN net to link 34 federal agencies. Page 7.

NEWSPAPER

FEATURE

Europeans unite to build digital cellular network

Continent cooperates on standard net as part of drive toward market unification by 1992.

By Raymond Boult
Special to Network World

The scheduled elimination of trade barriers within the European Economic Community by 1992 is expected to increase the number of standardized pan-European telecommunications services.

Design and implementation of pan-European services involves technical, commercial and political cooperation among many carriers and telecommunications equipment suppliers. In other words, the situation in Europe is practically the reverse of what's going on in the U.S.

An ambitious attempt to provide one such pan-European service was recently announced. A new digital cellular radio network, for which preliminary equipment contracts were awarded early last year, is expected to be operational by 1991. One of the objectives of the project is to allow access to

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New package gives micros data base server features

Dedicated data base machine sales may drop as a result of powerful 80386-based servers.

By Jim Brown
New Products Editor

The development of software that lets microcomputers act as data base servers on local networks is putting pressure on manufacturers of dedicated data base machines.

Equipped with advanced storage devices and data base server software, Intel Corp. 80386 microprocessor-based servers now rival data base processors in power and features, according to analysts. Both technologies allow multiple personal computers to share a single data base.

Analysts said the new local net technology will hurt sales of data base computers, and that manufacturers of these specially designed data base computers could feel further pressure if software is developed enabling local net-attached minicomputers to act as data base servers.

Microcomputer-based data base servers "give ordinary networked PCs access to the kind of data base performance that used to require a special dedicated data base machine," said Richard Schaffer, publisher of the New York-based industry newsletter "Computer Letter."

Both dedicated data base computers and microcomputer-based data base servers use an SQL-based client/server architecture to let multiple devices share a single data base. With this approach, client software runs on computers attached to either the data base computer or a local network. Server software runs on the data base computer or the microcomputer-based data base server.

Client software enables end users to issue SQL-formatted requests for data, which are then transmitted to the server software via a network. The server software retrieves the data and transmits it back to the client.

Dedicated data base computers, such as those made by Britton Lee, Inc. and Teradata Corp., are specially designed minicomputers outfitted with high-performance disk controllers and SQL-based data base management system software. Since Britton Lee sells at the low end of the market, it stands to lose the most from microcomputer-based data base servers, analysts said.

Britton Lee's low-end Server 300 product supports 50 users and 2G bytes of data storage for $50,000, a company spokesman said. Users can configure an 80386-based microcomputer with DBMS software to support the same number of users, but with about half the data storage and for about half the cost, analysts said.

High-end data base computers, sold by both Britton Lee and Teradata, manage data bases that approach or exceed a trillion bytes of data and support many more users than can a net of microcomputer-based data base servers. These high-end ma-

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MCI discounts E-mail by up to 75% to get big users

Cuts may presage lower E-mail prices from rivals.

By Bob Brown
Senior Writer

WASHINGTON, D.C. — In a move designed to lure large users to its electronic mail service, MCI Communications Corp. recently slashed its MCI Mail prices by up to 75%.

The new prices, which are scheduled to take effect Feb. 1, will reduce the cost of sending E-mail and eliminate some net access and subscription fees.

The pricing strategy could trigger similar price cuts by competitors, analysts said. At the very least, they are the first sign that lower E-mail fees are on the way.

Pricing is a way for vendors to differentiate themselves as their services become more alike and their networks are linked through X.400 gateways, industry followers said (see "AT&T, British Telecom to link messaging nets," page 6).

With MCI Mail, customers can use their computers to send domestic and international E-mail as well as telex and facsimile documents. The company has about 100,000 subscribers.

Under the new pricing plan, MCI deemphasized its Basic Service option by eliminating the price difference between it and the more feature-rich Advanced Service option.

Basic Service, which will still be offered, is menu-driven. Customers that have personal computer E-mail software have to go through two menus to transmit or receive a message, analysts said.

Besides cutting a menu, the Advanced Service offers step-saving commands, five-day message storage and mail forwarding.

MCI also announced an Ad-

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Briefs

AT&T tackles rivals. During yesterday's Super Bowl telecast, AT&T kicked off a promotional effort aimed at winning new customers for its Pro WATS service. AT&T offered to drop service fees and reimburse users for local exchange charges related to switching carriers. AT&T filed the changes with the Federal Communications Commission on Jan. 18, a spokeswoman said.

Bugs cause MCI crash. MCI Communications Corp. reported an outage of its 800 services last Tuesday morning that was caused by a glitch in new software designed to support those services. An MCI spokesman said less than one-quarter of MCI's 800 lines were affected by the outage, which was spread across the country. Most customers were inconvenienced for less than an hour, and service was restored completely by the afternoon, the spokesman said.

EDI entrepreneurs. Westinghouse Electric Corp., three U.S. banks and a small Atlanta-based software firm have formed a joint venture to sell electronic data interchange (EDI) software. The venture, called Harbinger*EDI Services, Inc., will sell personal computer-based EDI software that can be used to send documents over dial-up links.

Westinghouse Electric beta-tested the software nine months ago and subsequently purchased it from its developer, Harbinger Computer Services, Inc. (HCS). HCS is the majority partner in the new firm. The other partners in the venture are Citizens and Southern Corp. in Atlanta, First Bank System, Inc. in Minneapolis and Marine Midland Banks, Inc. in Buffalo.

Novell ships gateways. Novell, Inc. last week began shipping its SNA Gateway product line. The new products, announced last November at Comdex/Fall '88, let users connect their Ethernet-based NetWare local nets to IBM mainframes.

Novell's gateway line consists of the $2,995 NetWare SNA Gateway, $595 NetWare SNA Gateway Entry Level Solution (ELS) and $995 NetWare 3270 LAN Workstation. The NetWare SNA Gateway allows up to 97 workstations on a local net to communicate with an IBM or compatible Systems Network Architecture host computer. The NetWare SNA Gateway ELS permits up to five workstations to communicate with an SNA host. The NetWare 3270 LAN Workstation provides terminal emulation capabilities for any personal computer on the local net.

Calling all viewers. American Express Co.'s FDR Interactive Technologies subsidiary last week announced a voice response service capable of supporting as many as 30,000 calls at once. The service can be used for marketing surveys or sales promotions broadcast over television or radio. Viewers or listeners are urged to call 800 or 900 numbers in response to prompts.

MGM/UA Communications Co. will test the service this spring as part of its syndicated TV game show *Hotline*. During the game, the viewing audience will be asked to call in and give an opinion concerning a contestant's response to a question.

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Management Strategies
Teaming up to build nets or purchase communications products can yield big savings, but competitors considering joint endeavors can open a Pandora's box of problems. **Page 27**

Products & Services
Digicom is gearing up to announce a low-end V.32-compatible modem, while Codex upgrades its V.32-compliant line to support the Microcom Network Protocol and Hayes Microcomputer Products' enhanced AT command set. **Page 31**

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User indifference dulls optimism of ISDN application implementors

NIU Forum airs developments but few users in attendance.

By Bob Wallace
Senior Editor

GAITHERSBURG, Md. — ISDN application development efforts continued apace at the North American ISDN Users' (NIU) Forum here last week, but the progress was overshadowed by concern about low user turnout.

The NIU Forum's users and implementors groups attended the meeting to exchange information regarding Integrated Services Digital Network applications in an ongoing analysis and revision process designed to hasten acceptance of the standard.

But decreasing user interest in the NIU Forum was the talk of the conference. "I'm seriously concerned about the low user attendance and don't want these meetings to turn into a venue where vendors talk among themselves," said Jay Brandstadter, ISDN marketing manager for Northern Telecom, Inc.

The NIU Forum is made up of two groups: the ISDN Users' Workshop (IUW), which creates and submits applications to the other group, the vendor-oriented ISDN Implementors' Workshop (IIW). The IIW decides how the ISDN applications can be implemented.

Approximately 320 users and vendors attended the three-day meeting.

The National Institute of Standards and Technology (NIST) — formerly the National Bureau of Standards — formed the NIU to give users a strong voice in the development of ISDN applications. Vendors are using this input to develop marketable ISDN equipment and services.

Users in the IUW are grouped into six industry groups: manufacturing, process, service, financial services, government, and computer and communications. Each group is responsible for developing ISDN applications useful for its industry.

The industry groups presented 39 applications to the IIW for analysis when the two groups met for the first time in late September. The IIW applications analysis work group prepared drafts for 11 of the 39 applications and returned them to the IUW groups for comment at this meeting.

Individual IIW analysis teams are still working on 12 other applications and hope to have drafts ready in time for the NIU Forum's meeting here in March. Two ISDN applications have not yet been assigned to analysis teams.

Seven of the original 39 ISDN applications were classified as "ISDN issues" and were passed to the IUW's policy and issues group. "These are not applications. They're ISDN issues that attendees wrote down on application sheets and submitted to the IUW," said NIU Forum Vicegerant Donald Berteau. The issues include the need for ubiquitous ISDN, accelerated implementation of ISDN's Signaling System 7 and more ISDN pricing data.

More than a dozen new ISDN applications were also introduced at the meeting. The First National Bank of Chicago, the University of West Virginia, 3M Corp. and others submitted ISDN applications to the IUW, which then passed them along to the IIW. Application details were not released at the meeting.

But regardless of the progress made at the meeting, the group as a whole was concerned with the lack of user participation in the event.

"I was unpleasantly surprised to find that there were far fewer users here than there were at the [NIU Forum's last meeting in] St. Louis," said Scott Beale Jr., chairman of the IUW's Service Industries Group.

Only four of the 20 people who attended the Service Industries Group's first meeting were users. The rest were service providers and equipment vendors. "I don't feel we have enough user interest to enable us to devote the time needed to develop applications and move [them] through the process," said Myra Wright, an information systems planning associate with the University of West Virginia.

Joint meetings

In recognition of the problem, NIST announced plans to hold joint meetings with established users groups as a way of spurring increasing user participation. The NIU Forum is scheduled to meet in conjunction with the Open Systems Interconnection Implementors' Workshop here in March and with the Association of Data Communications Users in Boston in June.

Two IUW members have expressed frustration with the ISDN application development process.

David Norem, with the U.S. Navy, said he has not been able to track the applications his organization submitted at past NIU Forum meetings. "There's a big black hole out there. We submit applications, and they just disappear."

"We need an early take on our applications from the [IIW]," said James Splear, a telecommunications manager with Electronic Data Systems Corp., a General Motors Corp. subsidiary. "We want to know how feasible our [ISDN] applications are and when products [to support them] may be available."

NIST announced an electronic bulletin board service at the meeting which is designed to facilitate quick exchange of useful information about ISDN among users, service providers and other interested parties.

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New system monitors T-1 circuits

By Jim Brown
New Products Editor

DEERFIELD, Ill. — Clear Communications, Inc. is scheduled to announce this week a network management system that enables users to monitor and test the performance of T-1 facilities.

The start-up company's Clearview T-1 Surveillance System augments existing T-1 management products by enabling users to isolate faults in a multisegment, long-distance T-1 circuit. The system also lets users collect T-1 performance data to ensure that carriers live up to their performance guarantees.

Clear Communications will sell its system to end users and T-1 multiplexer makers wishing to integrate line monitoring and testing functions into their T-1 net management systems, according to the company.

The system consists of software running on a central-site Sun Microsystems, Inc. 386i color workstation and a series of Intelligent Probe Unit (IPU) boards housed in IBM Personal Computer AT-compatible microcomputers at each site in the T-1 network. Each Personal Computer AT can support up to four microprocessor-based IPU boards.

The IPUs sit between the local multiplexer and the incoming T-1 lines; they copy the diagnostic data in the T-1 bit stream as it passes by. The IPU, which supports superframe and extended superframe T-1 diagnostic formats, monitors both the send and receive paths of the T-1 link.

The superframe and extended superframe formats enable users to monitor how many times data had to be retransmitted and how many times the retransmitted data was received with errors.

The diagnostic data collected by IPUs at each site is transmitted to the central site via dial-up modems or via a channel on the T-1 network with a dial-up modem as a backup. The central-site Sun workstation displays a map of the T-1 net. When circuit performance degrades beyond a carrier-guaranteed parameter, the color of the faulty link changes. Users can then issue menu-driven commands to view more detailed information about the problem.

The Clearview T-1 Surveillance System enables users to trace a long-haul T-1 link across numerous central offices and detect faults between any two telephone company switches. This lets users give carriers the location of a faulty link.

Diagnostic data is stored in a relational data base included with the product. The data base lets users perform trend analysis on T-1 circuits to determine how often each link in the network fails to meet the carrier's guaranteed performance on a minute-by-minute, hourly, daily or monthly basis. Armed with this information, users can demand refunds from carriers.

Currently in beta test, the Clearview T-1 Surveillance System is scheduled to ship in the second quarter. A Sun 386i supporting color graphics and Clearview software, which includes a relational data base, costs $50,000. A Personal Computer AT outfitted with one IPU board costs $6,000. Additional IPU boards cost $1,990 each. Configuring a Personal Computer AT and four IPUs to support T-1 testing costs $1,990.

NET readies expert net tool

continued from page 1

NET's project can also be seen as part of a trend among T-1 vendors to shift intelligent net management capabilities from the multiplexers themselves to attached workstations. By doing this, vendors could make multiplexers less costly and the networks more easily expandable, according to some observers.

NET officials confirmed that the product is in development and scheduled for release sometime in the third quarter of this year, but they declined to elaborate.

According to Sara Spang, who outlined the development project for "The Spang Robinson Report on Artificial Intelligence," a Menlo Park, Calif.-based monthly newsletter, NET officials said the software initially would manage the company's Integrated Digital Network Exchange (IDNX) line of T-1 multiplexers.

Later, the company will expand the system to manage channel service units, which link equipment to T-1 lines, and then to other premises devices, according to Spang.

Strategic protocols

To achieve this goal, NET plans to rely, where needed, on what Spang termed strategic communications protocols, including Open Systems Interconnection protocols.

According to the report, the software is being written in C and will run under Unix on a Sun Microsystems, Inc. workstation, the computer used in NET's existing net management offering. (IBM, which remarkets NET's multiplexers, last September introduced an IDNX management system based on the IBM Personal System/2 Model 80.)

The expert system software will work with Oracle Corp.'s relational data base management system, according to the report.

The report said the product's price, presumably including the workstation and the DBMS, will be about $100,000. But Spang said the figure was tentative at the time of the NET briefing, and there were indications of a debate within NET regarding the price.

The new software could represent a shift for NET and possibly other T-1 vendors, according to Chrisman, who no longer works for NET. While he had no specific information about the new software, Chrisman did talk about NET's network management approach and the growing need among users for expert systems technology in on-line network management.

NET and other T-1 vendors provided minimal on-line management capabilities at the outset, he said. As a result, managing a T-1 net involved processing reams of historical data. NET and other vendors have added on-line management capabilities to display alerts and alarms as they occur and to respond automatically to certain problems.

But as networks grow in size and complexity, they can generate an almost bewildering amount of data instantaneously.

Expert systems could be used to process this data, diagnose problems, suggest solutions and their impact on the network, and even implement the solutions — all from a single workstation.

Expert techniques also could accelerate the move to shift T-1 net management structures out of the multiplexer and into a dedicated processor, according to Jack Freeman, senior data communications analyst with The Yankee Group, a Boston-based market research firm. The result could be significantly lower multiplexer costs, he said.

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HP to unveil OS/2, Unix versions of LAN Manager

By Susan Breidenbach
West Coast Bureau Chief

CUPERTINO, Calif. — Hewlett-Packard Co. is scheduled to announce its LAN Manager family of network operating systems today, along with two personal computer Ethernet interfaces for unshielded twisted-pair cable.

HP hopes to distinguish itself from Microsoft Corp.'s more than 30 LAN Manager OEMs by offering versions of LAN Manager for both the OS/2 and Unix operating systems. HP was selected by Microsoft last year to help port LAN Manager to Unix (see "HP pegs LAN Mgr./X as industry standard," page 25).

The minicomputer maker's two versions of LAN Manager will be interoperable, so users will have transparent access to both OS/2-based and Unix-based servers, according to Ormond Rankin, product marketing manager for personal computer networking at HP.

Both HP LAN Manager and HP LAN Manager/X will support the same application program interfaces, including Microsoft's Named Pipes, Mail Slots and Server Message Block protocols, as well as the interprocess communications facilities in Berkeley Unix. This ensures that applications can be used in either operating system environment.

Together, the two network operating systems will run on a range of HP hardware based on Intel Corp., Motorola, Inc. and Reduced Instruction Set Computing (RISC) microprocessors.

The processor range will provide users with a "scalable server" growth path. Users can initially implement HP LAN Manager on an Intel-based HP Vectra personal computer, for example, and later upgrade to HP LAN Manager/X on a RISC-based HP 9000 minicomputer.

"One of the strategies that has worked very well for HP is [maintaining] a very broad product line," said Jeanette Sill-Holeman, a senior analyst at InfoCorp, a Santa Clara, Calif., consultancy. "Anything you want, they have. This is a continuation of the same strategy in the networking area — offering even more options for putting things together."

In addition to the Unix connection, HP is differentiating its LAN Manager offerings by bundling in the Transmission Control Protocol/Internet Protocol, said David Passmore, a principal at Network Strategies, a telecommunications consulting practice of Ernst & Whinney.

TCP/IP support has already been built into HP's various systems, so it can be used as a common protocol to communicate among HP machines running LAN Manager and those running other operating systems. HP is porting its own TCP/IP software to LAN Manager, rather than using the TCP/IP option developed for Microsoft by Excelan, Inc.

A third feature that sets HP LAN Manager and HP LAN Manager/X apart from the rest of the crowd is the inclusion of software hooks to HP's OpenView network management system, according to Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

Dzubeck said, however, that most of HP's networking software is only of value in the HP environment. The company is not willing to unbundle its software for use on other vendors' equipment.

Other LAN Manager OEMs, by contrast, are marketing off-the-shelf software packages for LAN Manager that run across several hardware lines.

"If you have a DEC machine, it's irrelevant," he said. "You have to have HP computers to run this stuff, however wonderful it might be. You aren't going to find it in a shrink-wrapped box."

HP LAN Manager and HP LAN Manager/X are both scheduled for release in the second half of this year.

The two new HP Starlan 10 adapters will be available in the second quarter. HP said the adapters have been certified to operate with Novell's NetWare.

A version for IBM's original Personal Computer bus lists for $495, and a Micro Channel version costs $595.

> Users will have transparent access to both OS/2-based and Unix-based servers.
>
> ▲▲▲

Corrections: Due to erroneous information provided by a vendor, the story "NCR overhauls internal net, opts for X.25 backbone" (*NW*, Dec. 26/Jan. 2) incorrectly identified the name of NCR's Worldwide Information Network.

Also, the story "Brokerage steers clear of disasters" (*NW*, Jan. 9) incorrectly reported the title of Jim Trimiglozzi. Trimiglozzi is assistant vice-president of communications disaster recovery and information security with the Contingency and Recovery Group at Merrill Lynch, Pierce, Fenner & Smith, Inc.

CrossComm introduces low-cost T-1 bridge for NetWare local nets

T1B bridge is 75% less expensive than Vitalink's TransLAN.

By Laura DiDio
Senior Editor

MARLBOROUGH, Mass. — CrossComm Corp. and Network Products Corp. last week announced a wide-area network bridge that enables Novell, Inc. users to link remote NetWare local nets using T-1 services.

Until now, users had two options for linking remote NetWare networks. They could opt for Novell's own 56K bit/sec X.25 bridge or, for about $18,000, they could buy Vitalink Communications Corp.'s TransLAN T-1 bridge product.

At $4,850, the new T1B bridge is about 75% less expensive than Vitalink's TransLAN.

The T1B is a controller card that fits into the chassis of a Novell NetWare file server or personal computer configured as a bridge device. It also includes a software driver for Advanced NetWare Version 2.1 or higher. This software driver works in conjunction with the NetWare file server.

According to CrossComm President Tad Witkowicz, the T1B is the result of a six-month joint development effort by CrossComm, based here, and Network Products, a Pasadena, Calif., software developer.

The T-1 controller card is equipped with both RS-422 and T-1 ports, allowing users to transmit data at speeds ranging from 19.2K bit/sec to the 1.544M bit/sec speed of T-1 circuits. The controller also supports 2.048M bit/sec, which is the European T-1 transmission rate.

Each T1B can support as many as four remote network links. The T1B can link all Novell-supported network topologies, such as Ethernet, Arcnet and token ring.

Both CrossComm and Network Products will sell and market the T1B under their respective company names and logos, Witkowicz said.

Depending on the size of the organization and its needs, there are five ways users can employ the T1B bridge, Witkowicz said. The T1B can be used with dedicated T-1 lines. This option is especially suited for banks and brokerage houses that transfer high volumes of data on a daily basis.

The T1B can also directly interface to a T-1 multiplexer through the unit's RS-422 port. This option is likely to be the most popular implementation, Witkowicz said. Users who have already installed a corporate T-1 network can allocate any fraction of their T-1 bandwidth to carry the T1B network traffic.

In addition, the T1B can be used to access multiple network locations. With as many as three T1B controllers in a Novell file server, an organization can transmit data to multiple remote locations.

The new wide-area bridge can also establish T-1-to-X.25 connections. The T1B is fully interoperable with all Novell X.25 bridge and gateway products. Thus, a business that has an Arcnet network can use an X.25 Novell bridge at one site and a T1B at another to link the two nets.

The T1B controller card can also be installed in a personal computer configured as a Novell bridge. This enables users on remote local nets to connect to the main corporate file server and access data, thus eliminating the need to install a file server at each remote location.

Novell has no immediate plans to build a wide-area T-1 bridge of its own, according to Charles King, vice-president of marketing at its Network Products unit.

CrossComm is awaiting Novell certification of the T1B's compatibility with NetWare.

MCI discounts E-mail 75% to get big users

continued from page 2

vanced Service Preferred Pricing Option that, for a onetime $25 sign-up fee and a $10 monthly fee, covers the cost of 40 messages consisting of up to 7,500 characters each.

A user that transmits 40 messages a month under the plan pays 25 cents per message, a 75% savings compared to the current $1-per-message charge for missives ranging in length from 501 to 7,500 characters. During a six-month promotion starting in February, the $25 fee will be waived for new customers and current users that want to convert to the plan.

Under the revised MCI Mail Advanced Service plan, users will pay 75 cents for messages that are 501 to 2,500 characters in length, down 25% from the current $1 per-message cost.

For sending E-mail via its Fax Dispatch service, MCI reduced the price from 60 cents for the first half page and 40 cents for each additional half page to 50 cents and 30 cents, respectively.

As part of its price reductions, MCI said it would offer an 800 telephone number that will allow users to access the MCI Mail network to send messages from anywhere in the U.S. Access currently costs 10 cents per minute.

Mike Cavanagh, executive director of the Electronic Mail Association, a Washington, D.C.-based trade association for E-mail vendors and users, said the new MCI Mail prices probably will not spur a slew of price cuts in the short term.

"But you'll see a substantial decrease in the cost of using E-mail over the next five years as the industry matures," he said.

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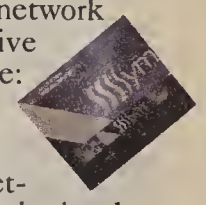

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X.400 poised on the brink

continued from page 1

panies such as Hughes and others would like to do this but can't because everyone has different systems."

"We have about six million people using E-mail today — but largely just within their communities of interest," said Mike Cavanagh, executive director of the Electronic Mail Association, a Washington D.C.-based trade group.

"X.400 sets up the infrastructure for widespread interconnection," he said. "A number of things are coming together to facilitate this taking off in the next few years."

Merging public nets

In the near term, the impact of X.400 is likely to be felt most widely in public E-mail networks. Several vendors, including AT&T, US Sprint Communications Co. and MCI Communications Corp., already have announced X.400 interconnections from their domestic E-mail networks to public E-mail networks in other countries. Such interconnections are valuable for E-mail service providers since they allow network users to broaden their international reach.

Now, in response to customer pressure, public E-mail providers are undertaking the more difficult chore of interconnecting their competing domestic networks using X.400.

Last week, two service providers, AT&T and British Telecommunications plc, announced they will interconnect their E-mail nets via X.400 by the end of March (see "AT&T, British Telecom to link messaging nets," this page). Officials from AT&T, MCI and US Sprint's Telenet Communications Corp. said their companies are currently working toward interconnecting with other domestic service providers.

Some observers believe that domestic interconnections will proliferate this year.

"I would bet that, by the end of 1989, there will be virtually complete interconnection of all [E-mail] service providers, both international and national," said James White, former director of messaging architecture at US Sprint's Telenet E-mail network and current chairman of the Consultative Committee on International Telephony and Telegraphy committee that established the latest version of X.400.

Upendra Gupta, product manager for the directory services program at Telenet, said White's timing is optimistic. She agreed, however, that "over time, widespread domestic interconnection is bound to happen."

Aerospace efforts

But as early as next month, widespread domestic interconnection of public nets via X.400 gateways may be a reality.

Recently, the Airline Industry Association (AIA), which represents nearly 50 of the nation's largest aerospace companies, entered into an interconnection project with eight major public E-mail service providers. Companies including AT&T, IBM, MCI and GE Information Services have agreed to link their E-mail networks through X.400 for AIA members.

The group hopes to run a pilot test of these interconnections on Feb. 1, according to Donaghy, who is Hughes Aircraft's AIA representative.

According to Donaghy, each of seven aerospace companies will link its internal E-mail nets to a different public network through a proprietary or X.400 interface. Then each firm will send a message to the other six. These messages will pass through two or more public networks via X.400 gateways before reaching their final destination.

Donaghy said the aerospace companies hope that, within six months, they will have a fully operational E-mail interconnection system that can be used by thousands of end users within their companies.

Some cautions

Observers point to the AIA project and other activity as proof that X.400 interconnection and use will soon surge. Others, however, are less optimistic.

Significant technical barriers still hinder widespread implementation of X.400. Since no X.400 interoperability testers are available, most makes of X.400 gateways must be modified slightly to work with one another.

And there are still no products on the market that allow users to find addresses easily on interconnected E-mail nets. In order to send a message, users must know the E-mail address of the recipient on the other E-mail system.

This problem may be resolved by implementation of an OSI standard known as X.500 Directory Services. X.500 specifies a standard way for a user on one E-mail system to quiz directories and find addresses of users on other E-mail systems. The specifications for this standard were finalized at a Plenary Session of the CCITT last November.

But, according to White, it will be several years before a full suite of X.500 directory services products are available.

These difficulties lead some industry observers to be cautious in their predictions about the spread of X.400.

"I think it will happen a lot slower than most people think," said Steven Caswell, author of the book *E-Mail*. "I think it's more reasonable to say that, sometime within the next 10 years, everything will fall into place, and you will see a dramatically increased use of X.400 in E-mail."

X.400 notes

- **Some major computer makers offering X.400 gateways:** IBM, DEC, Prime Computer, Inc., DG, Wang, Unisys Corp., HP, Sun Microsystems, Inc. and Apollo Computer, Inc.
- **Public E-mail services offering X.400 gateways** MCI Mail, US Sprint Telemail, GE Information Services Quik-Comm, AT&T Mail, British Telecom Dialcom.
- **Service providers participating in AIA X.400 trial:** IBM Information Network, McDonnell Douglas Network Systems Group On-Tyme, US Sprint Telemail, GE Information Services Quik-Comm, AT&T Mail, Western Union Corp. EasyLink, British Telecom Dialcom, MCI Mail

AT&T, British Telecom to link messaging nets

BRIDGEWATER, N.J. — AT&T and British Telecommunications plc last week announced plans to link their public messaging networks using X.400 gateways.

The agreement, which calls for the companies to forge an X.400 electronic mail connection by the end of the first quarter, will permit approximately 40,000 AT&T Mail subscribers to swap messages with the 130,000 U.S. subscribers to British Telecom's Dialcom Electronic Mail.

The union of the two E-mail systems will not, however, create the largest pool of users on an existing public messaging system. The E-mail net in the U.S. with the most subscribers is CompuServe, Inc.'s EasyPlex, with 480,000 users, according to research from International Resource Development, Inc. in New Canaan, Conn.

The combined reach of the AT&T/British Telecom messaging system will also likely fall just short of the second largest messaging network, Western Union Corp.'s EasyLink, which has 175,00 subscribers.

AT&T and British Telecom agreed to forge the link because of their relationship in the multimillion-dollar Federal Telecommunications System 2000 contract, a spokesman for the London-based carrier said. British Telecom subsidiary Dialcom, Inc. is a subcontractor on AT&T's winning team and already provides E-mail service to 25,000 federal government subscribers.

— Barton Crockett

US Sprint slashes T-1 service rates

By Paul Desmond
Staff Writer

KANSAS CITY, Mo. — On the heels of a similar move by AT&T, US Sprint Communications Co. last week announced T-1 service price cuts averaging 48% for volume users.

The reductions, which will go into effect April 1, offer savings of between 40% and 50% for volume users — those that spend more than $20,000 monthly and commit to at least one year of US Sprint's Clearline 1.5 service.

Base rates for users that do not commit to a full year or that spend less than $20,000 per month will be cut between 5% and 30%, depending on the length of the T-1 circuit, according to Mark Schweitzer, director of product marketing for US Sprint.

US Sprint said the new pricing gives users savings of up to 66% compared with AT&T prices.

Last November, AT&T proposed price changes for its own T-1 offering, Accunet T1.5 Service ("AT&T files to lower T-1 rates, expand discounts," *NW*, Nov. 14, 1988). AT&T said it would decrease monthly rates, expand volume discounts and eliminate monthly subscriber fees.

The new pricing would represent a 25% decrease for a typical 300-mile-long T-1 circuit.

US Sprint's Schweitzer said his company's price cuts were more in response to competition from regional fiber carriers than from AT&T.

"We didn't need to do what we're doing to respond to AT&T," he said. "We're trying to address what have become very significant players in the marketplace."

As examples, he cited Williams Telecommunications Group, Inc. as well as SouthernNet, Inc., which recently merged with Teleconnect Co. to form Telecom*USA, Inc.

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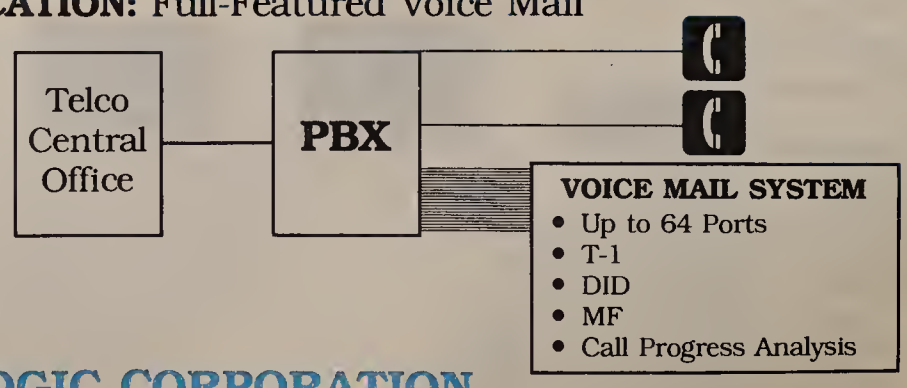

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Nynex issues interface specs for packet-switched LAN connection

By Bob Brown
Senior Writer

WHITE PLAINS, N.Y. — Nynex Service Co. has announced network interface specifications for a new high-speed packet-switching service designed to link local networks.

The Local Area Network Interconnection Service is expected to be made available in the third quarter. It will use central office-based routers to link local networks at one or several customer sites.

Nynex Service provided net interface specifications to allow local net vendors to develop products that support the service. These vendors will probably have to make only minor software changes to existing products, according to Mike Behan, product manager for Nynex Service, a subsidiary of Nynex Corp.

Nynex claimed it is the first regional Bell holding company to announce such a service. But Behan said other carriers are planning similar offerings. Availability of compatible services from other RBHCs would allow users to interconnect local nets across the country.

The interconnection offering will be a central office-based high-speed packet-switching service that will link Ethernet and token-ring local networks, Behan said. The service will allow users to tie hundreds of local nets together within Nynex's territory, but Behan said he expects most users will link a far smaller number. Access lines between customer premises and the Nynex central office will be provided at either 56K bit/sec or T-1 speeds.

The initial local net interconnection offering will support the Transmission Control Protocol/Internet Protocol. Future versions could support Digital Equipment Corp.'s DECnet protocol and Xerox Corp.'s Xerox Network Systems protocol if customers ask for them, Behan said.

The new service will be fundamentally different from existing central office local net offerings, Behan said. The service will provide data transmission between local nets. With a central office local net service, central office equipment acts as a server for workstations on the user site, he said.

The new service can be utilized by users whose needs extend beyond one central office. A backbone network of central office nodes can be provided using services such as Nynex's Digipath or Superpath.

"The basic advantage would be that we would provide network management," Behan said. "As you get into a multinode environment with many different locations, management is a real problem that a lot of corporate customers would be very happy for one vendor to take over."

Customers that require connections of local nets in different local access and transport areas will also be able to take advantage of the new service, Behan said. Nynex will pass a customer's traffic from its central office to a long-haul carrier, which in turn will pass it back to a Nynex central office in the receiving LATA to complete the connection.

GSA awards ISDN contract to Bell Atlantic

By Wayne Eckerson
Staff Writer

WASHINGTON, D.C. — The U.S. General Services Administration last week awarded a multiyear contract to Bell Atlantic Corp. for a private ISDN network that will link 34 federal agencies and save the government more than $40 million during the next decade.

The voice and data digital network — known as the Washington Interagency Telecommunications Service (WITS) — will replace an existing Centrex installation and serve more than 100,000 Washington-area federal employees.

The WITS network is part of a major effort to overhaul the government's phone service. The contract award comes on the heels of the $25 billion Federal Telecommunications System (FTS) 2000 contract, which the GSA recently awarded to AT&T and US Sprint Communications Co. ("AT&T, US Sprint win coveted fed net deal," *NW,* Dec. 12, 1988). WITS will be linked to FTS 2000 as well as the public-switched network.

"WITS will provide for flexibility and growth in data communications in the federal community," said George Patton, director of WITS.

Neither GSA nor Bell Atlantic officials would disclose the technical details of the network, citing contract laws. They said more information may be released after BellSouth Corp., the other contract bidder, is briefed on the decision.

The 10-year contract is estimated to be worth more than $220 million. Bell Atlantic's local subsidiary, The Chesapeake and Potomac Telephone Co., will install and run the network, which should be completed in three years, GSA officials said.

AT&T, Bell Atlantic's prime subcontractor in the deal, will supply 5ESS digital central office switches, Integrated Services Digital Network software, digital telephones, facsimile machines and other customer premises equipment.

The GSA is replacing an analog Centrex system provided by Chesapeake and Poto-

(continued on page 54)

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Micros get server features

continued from page 2

chines can support mainframes and local net-attached mini- and microcomputers.

Although it views local net-attached, microcomputer-based data base servers as a threat at the low end of the market, Britton Lee is not yet ready to fold its tent. In fact, it welcomes the competition, saying it helps promote the client/server data base management architecture.

"We're not saying we're going to wipe out [microcomputer-based data base servers], but we don't think they're going to wipe us out either," said Bob Taylor, executive vice-president for research and development at Britton Lee.

While admitting that users with small data base transaction volume and data storage requirements could opt for a microcomputer-based data base server, Taylor said he thinks users requiring the power to support high transaction volumes and massive data storage would be better served by Britton Lee computers.

Analysts concede microcomputer-based data servers currently have some hardware limitations compared with data base computers. Most notably, analysts said, a data base computer supports higher performance because it has minicomputer processing power and a fast I/O channel architecture.

But over the next two years, the lines between dedicated data base computers and microcomputer-based data base servers will blur. This will be driven in part by the imminent arrival of an Intel 80486 microprocessor, which will enable microcomputers to replace minicomputers in local nets.

"I really think LAN servers will come along and be very good data base servers in about two or three years," said Dale Kutnick, an independent consultant in Reading, Conn.

The recent development of data storage technology that enables microcomputers to support 1G byte of storage is a boost to the microcomputer-based data base server market, said Frank Dzubeck, president of Washington, D.C.-based Communications Network Architects, Inc. However, the microcomputer's I/O bus also needs to be improved if microcomputers are to retrieve data from attached disks at the same speed as a minicomputer I/O channel, he said. Not even IBM's highly touted Micro Channel architecture can rival such minicomputer I/O channels as Digital Equipment Corp.'s VAX BIbus, he said.

From its position at the high end of the data base computer market, Teradata simply views local net-attached, microcomputer-based data base servers as a complement to its existing product line, said David Clements, director of marketing. "We don't see it as a threat at all to what we're doing," he said.

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Breidenbach selected as bureau chief

SAN FRANCISCO — *Network World* has named Susan Breidenbach to the post of West Coast Bureau Chief. Breidenbach will oversee operations at the newspaper's bureau here and will report on personal computer communications and local networking.

Before joining *Network World,* Breidenbach served as technology editor for *Computer Reseller News (CRN)*. She reported on the connectivity market for *CRN* and its supplement *LAN Week*, and oversaw technology coverage for *CRN*.

Breidenbach has also worked for the Institute of Electrical and Electronics Engineers publication *Computer Graphics and Applications* and as a reporter for *The Los Angeles Times* and *The Christian Science Monitor.*

"We're pleased to have someone with so much experience covering desktop communications," said Gary Beach, president of Network World Publishing, Inc. "Susan will help us expand our already strong coverage in PC communications and local networking."

Network World's West Coast Bureau is located at 501 Second St., Suite 600, San Francisco, Calif. 94107, or call (415) 978-3160.

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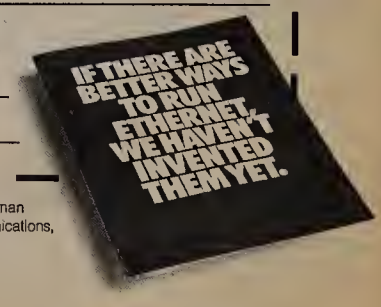

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

"The computer and communications industry has stimulated the global marketplace by making it easier to conduct international business. In 1992, issues like distribution in Europe will become simpler, so competition will become keener."

Robert Potter
President and chief executive officer
Datapoint Corp.
San Antonio, Texas

People & Positions

Paul Stern will join **Northern Telecom Ltd.** as vice-chairman and chief executive officer effective March 1. He will report directly to Chairman Edmund Fitzgerald, who plans to retire in April 1990. Stern will then assume Fitzgerald's position.

Stern was formerly president and chief operating officer of Burroughs Corp. and president of Rockwell International Corp. He has served as a consultant to Northern Telecom and was elected to its board of directors in 1988. Toronto-based Northern Telecom supplies digital telecommunications systems.

David Systems, Inc. announced the appointment of **Henry Nothhaft** as president and chief executive officer. Previously, Nothhaft was president of DSC Communications Corp.'s Business Network Systems Group. He replaces **Luigi Mercurio,** who recently assumed the presidency of Olivetti Systems and Networks, a subsidiary of Ing. C. Olivetti & Co., S.p.A. Mercurio will remain chairman of David Systems.

David Systems, based in Sunnyvale, Calif., provides connectivity for multiline telephones, personal computers and data terminals over existing telephone wiring.

New opportunities come with Glasnost

Gorbachev's new directions bring hope of open communications market, international alliances.

By Bob Brown
Senior Writer

WASHINGTON, D.C. — The era of Perestroika and Glasnost in the Soviet Union promises new market opportunities for U.S. vendors of communications products and could benefit Western users as well.

Soviet President Mikhail Gorbachev's bullishness for a more open Soviet society has raised expectations at some U.S. communications firms that want to sell their products in the Soviet Union and form joint associations with Soviet enterprises.

Soviet trade alliances could involve technology sharing between U.S. and Soviet communications equipment makers, as well as the manufacturing of U.S. vendors' wares in the Soviet Union for sale at home and abroad. Fabrication of U.S. vendors' products in the Soviet Union, where labor is cheap, could conceivably translate into lower product prices for users.

For the Soviets, their society will open up and become more accessible to other countries with improvements to Soviet telecommunications, said Randy Bregman, director for Soviet and Eastern European Services at Apco Associates, a Washington, D.C.-based consulting firm.

The Soviet Union is a fertile market for communications equipment made by Western firms, said Bregman, who has worked with the Soviets for about 20 years in a number of capacities. The Soviets need such things as an improved telephone network, facsimile machines and electronic data interchange (EDI) equipment, Bregman said.

The Soviet Union has an especially high level of interest in EDI, according to Robert Crowley, business systems manager for Trans Freight Lines, a Wayne, Pa.-based steamship company and a general member of the North American EDI For Administration, Commerce and Transport Board, which operates under the United Nations. EDI transactions with the Soviets would be a

(continued on page 13)

INDUSTRY BRIEFS

IBM last week announced increased earnings and revenue for the fourth quarter and year ended Dec. 31, compared to the corresponding periods in 1987.

Worldwide earnings for the fourth quarter were $2.3 billion, up 12.4% from $2.1 billion for the comparable period last year. Revenue increased 9.3%, to $20 billion in the fourth quarter of 1988 from $18.3 billion in the fourth quarter of 1987.

For the year ended Dec. 31, IBM earned $5.8 billion, up 10.4% from 1987 earnings of $5.3 billion. Worldwide revenue for 1988 was $59.7 billion, up 8% from 1987 revenue of $55.3 billion. Non-U.S. earnings of $4.1 billion represented an increase of 23.3% over the previous year's non-U.S. earnings of $3.3 billion.

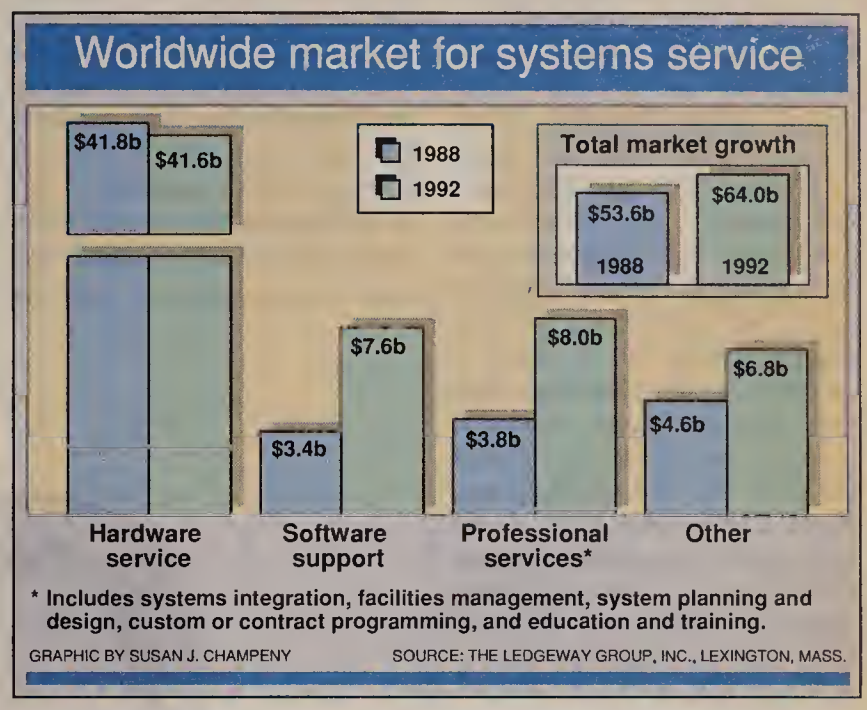
Network Equipment Technologies, Inc. last week reported a 4.7% increase in earnings and a 43% jump in revenue for the third quarter, ended Jan. 1.

The Redwood City, Calif.-based maker of multiplexer and T-1 products reported earnings of $4.2 million for the third quarter compared to $4 million for the third quarter of 1987. The 1987 earnings included a $559,000 extraordinary credit related to the use of net operating loss carryforwards, the company said.

Revenue rose to $35.5 million in the third quarter of 1988, from $24.8 million in the comparable quarter the year before.

Apple Computer, Inc. last week reported net income of $140.5 million for the first quarter, ended Dec. 30, 1988, up 16% from the $121.4 million earned in the corresponding period the year before.

Apple reported revenue of $1.40 billion for its first quarter, up 35% from $1.04 billion for the comparable quarter the year before.



Vendors take sides over RBHC-funded R&D projects

Greene sets agenda for Ameritech hearings.

By Anita Taff
Senior Correspondent, Washington

WASHINGTON, D.C. — Communications manufacturers continued to battle last week over how much freedom the regional Bell holding companies should have in funding the development activities of network equipment vendors.

Although the Consent Decree and recent rulings from U.S. District Court Judge Harold Greene prohibit the RBHCs from designing, developing or fabricating communications products themselves or through an affiliate, it remains unclear what other types of financial arrangements the local carriers can pursue.

Last week, Greene set up a schedule for hearings on an Ameritech request for permission to fund the development activities of independent communications manufacturers in return for the royalties from the sale of products resulting from the partnership.

Earlier this month, the Department of Justice urged Greene to approve Ameritech's request ("Justice endorses RBHC plan," *NW,* Jan. 9).

The Ameritech request, which was originally filed in 1986 when the company proposed a funding arrangement with David Systems, Inc., has divided the manufacturing community. But companies on both sides of the issue agree that the stakes are high for both users and vendors.

Opponents claim that once the RBHCs have a financial stake in a manufacturer, they could use their control of the network and considerable purchasing power to hurt competing manufacturers. Such anticompetitive behavior could lead to fewer technological innovations and higher prices for users, critics say.

Bob Stearns, vice-president of corporate marketing and business development for Codex Corp., said the company strongly objects to the Ameritech funding request. "If Ameritech were allowed to fund a manufacturer, it would set up the same dynamic as having an internal supplier," Stearns said. The RBHC would most likely use equipment produced through the funded manufacturer and would have a vested interest in seeing the manufacturer succeed, he said.

"When an RBHC funds a company and receives royalties on the sale of the company's products, the RBHC has a very strong incentive to make that company a success even if the company is not the lowest cost producer or the best quality producer," said Robert Aldrich, counsel for the North American Telecommunications Association, which represents more than 700 manufacturers, vendors, suppliers and users of communications equipment.

Companies on both sides of the issue agree that the stakes are high for users and vendors.

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Jim Casserly, counsel for the Independent Data Communications Manufacturers Association, also raised concerns that the RBHCs would be able to exert too much control over manufacturers through funding arrangements.

(continued on page 18)

DSC merges 2 units; pink slips sent to 300 workers

Rival Avanti moves some operations to Boston.

By Paul Desmond
Staff Writer

PLANO, Texas — DSC Communications Corp. recently announced it will consolidate its two principal business groups and lay off most of the 300 employees affected by the move.

DSC's consolidation comes on the heels of layoffs late last month at one of its competitors in the high-end T-1 marketplace, Avanti Communications Corp. of Newport, R.I. Avanti laid off more than 10% of its 280 employees, mostly in the manufacturing area, said Tom Taylor, the company's president.

DSC will consolidate its Public Network Group, based here, and its Santa Clara, Calif.-based Business Network Systems Group into a single operation — Network Products, according to a company spokesman.

The Public Network Group sells telecommunications switching and transmission products to public carriers. The Business Network Systems Group markets networking products ranging from local networks to intelligent T-1 multiplexers. It includes two acquired businesses — Granger Associates, Inc. and Nestar Systems, Inc. — as well as Granger Telettra, a joint venture with Telettra SpA of Milan, Italy.

The consolidation was prompted by two factors, the spokesman said. The company decided to drop its North American standard transmultiplexer — which once accounted for about one-third of the company's total revenue — from the Business Network Systems Group due to diminishing demand for the product in the U.S. The transmultiplexer provides the translation from an analog switch to a digital switch. It will continue to be sold in the international marketplace where demand remains strong, but DSC will lay off a number of the employees associated with the U.S. transmultiplexer business, the spokesman said.

The other factor contributing to the consolidation is the blurring of the distinction between the two groups. Many of the Fortune 1000 companies that bought products from the Business Network Systems Group now also buy central office-type products sold by the Public Network Group, the spokesman said.

Earlier this month, the president of the Business Network Systems Group, Henry Nothhaft, left DSC to become chief executive officer of David Systems, Inc. (see "People & Positions," page 11). Due to the consolidation, he will not be replaced.

DSC plans to keep its Santa Clara office open but will eliminate many administrative positions as well as those of the personnel in the transmultiplexer business. Other workers will be transferred here. A total of 300 of DSC's 3,000 employees will be affected in some way by the consolidation, mostly through layoffs, the spokesman said.

Avanti, meanwhile, is also shifting gears by contracting out for the assembly of its high-speed modems and a range of multiplexers, a move that led to the elimination of 30 to 40 of the company's 280 jobs, Taylor said.

In addition, the firm is moving some of its operations — including engineering, software development and some marketing positions — to a new office in Boston in order to keep up better with the growth the firm sees in its core T-1 multiplexer business.

"A lot of our recruiting takes place in the Northeast or in the Boston market," Taylor said. "Rather than continue to relocate people, we're moving a facility there so we can grow these positions in that area."

Avanti is shifting gears by contracting out for the assembly of its high-speed modems.

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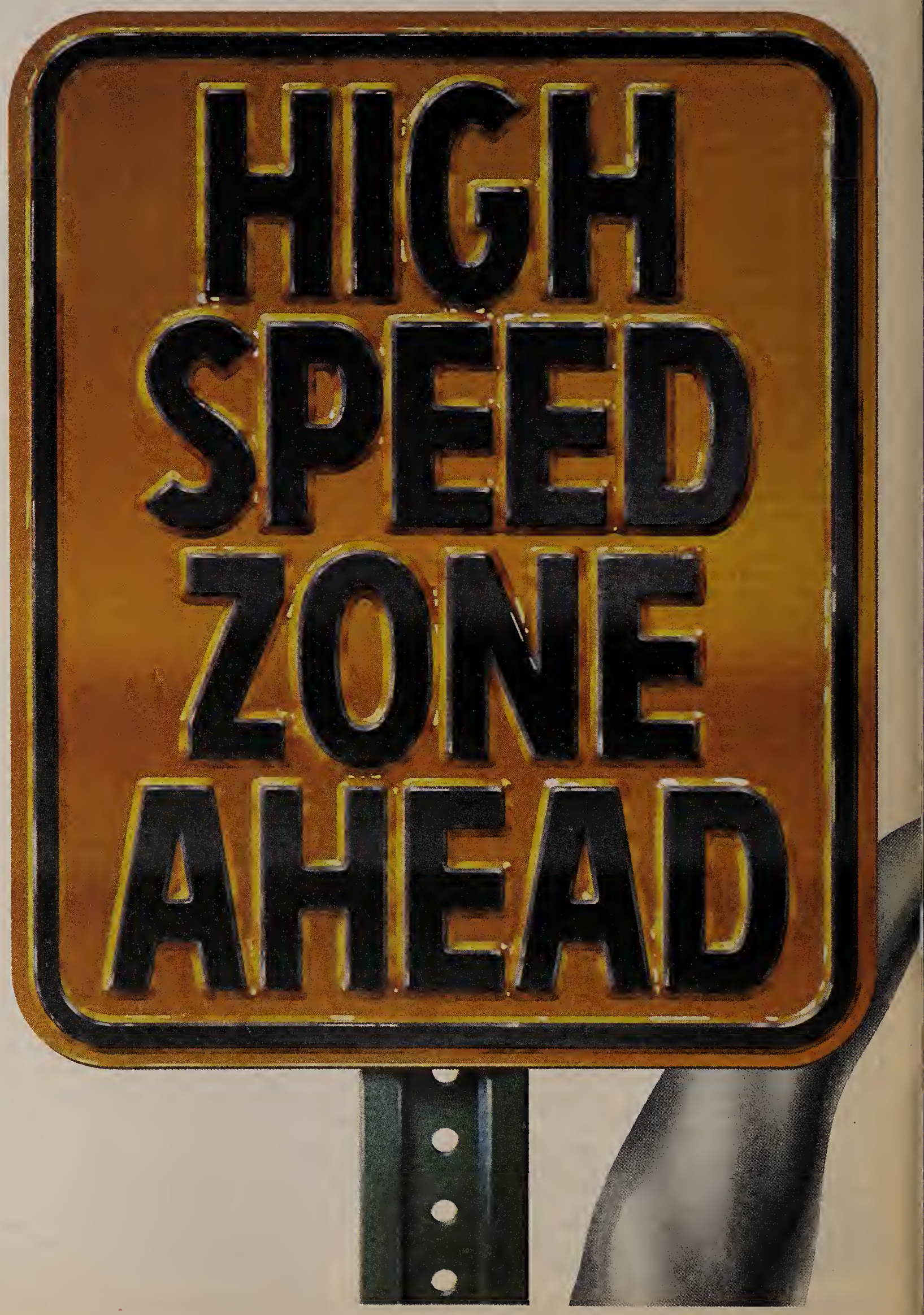

Opportunities with Glasnost

continued from page 11

benefit to shipping firms that do business with the Soviets, said Crowley, whose group is working on an international EDI standard.

"Telecommunications is a clear way of breaking down the Soviet Union's old system," Bregman said. "The new [telecommunications] system offers the best business opportunities for vendors and users, while the old system offers almost none."

Bregman said Apco Associates expects to join formally in a partnership with a Soviet counterpart called Infeks at the end of this month. Apco Associates and Infeks, a consulting cooperative launched six months ago by the Soviet Ministry of Foreign Economic Relations, have united to encourage Western business development in the Soviet Union.

This year, the joint venture is expected to match at least a dozen U.S. companies from a variety of fields with Soviet groups. Telecommunications firms have been among the most enthusiastic respondents to the joint venture so far, said Bregman, who declined to divulge the identities of those telecommunications firms already working to build Soviet relations through Apco Associates.

In a similar effort, the Telecommunications Industry Association (TIA), a trade group of about 600 telecommunications product suppliers, is tentatively organizing a trip to Russia in June during which about 12 of its members will meet with the Soviet Ministry of Science and Technology and other Soviet groups. The purpose of the meeting will be to discuss the possibility of U.S. telecommunications vendors selling products to the Soviets that they can already buy elsewhere or other products that are not critical to the military, said TIA President Mike Frischkorn.

"This mission should serve as a catalyst for U.S. telecom companies to get into the Soviet market in a big way, assuming the political situation stays the same," Frischkorn said.

Hungary vendors

Garet Romeo, executive vice-president of Porta Systems, Inc. in Syosset, N.Y., said his company recently sold the Hungarian Post, Telephone and Telegraph administration a line condition reporting system and is now targeting the Soviet Union and its Eastern bloc neighbors for future sales or joint ventures.

"The Soviet Union is our No. 1 target in terms of growth in the Eastern bloc," said Romeo, whose company also sells digital access and cross-connect systems. "Not only is it a huge market, but they are starting from a very low installed base.

Despite telecommunications being a Soviet priority, a number of barriers remain that could discourage Western businesses from testing the market, Bregman said. In addition to the nation's primitive telephone network, U.S. export controls and a lack of foreign currency reserves in the Soviet Union are all considerable obstacles, he said.

It can take up to eight hours to make a phone call out of the Soviet Union, since calls must be ordered, Bregman said. As for U.S. export controls, the U.S. government, particularly the Department of Defense, is guarded about permitting high-technology products into the Eastern bloc, a Commerce Department spokeswoman said.

Potentially an even larger issue for U.S. vendors that penetrate the Soviet market is that political opponents to Gorbachev's policies could make business operations difficult. Telecommunications research and applications development have been held down in the Soviet Union mainly for political reasons, Bregman said.

But the benefits for those vendors that persist include inexpensive labor and raw materials and a foot in the door for possible sales into the USSR, he said.

Also, Western telecommunications firms would have the chance to work in technology transfer agreements with the brightest citizens the Soviet Union has to offer, since research is the principal occupation for the technologically elite.

Some Eastern bloc countries, including Hungary and Poland, have already made progress building more sophisticated telecommunications networks. Their success may send a signal to neighboring nations that they have no choice but to improve their communications networks, Bregman said.

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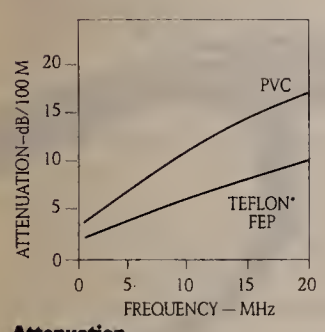

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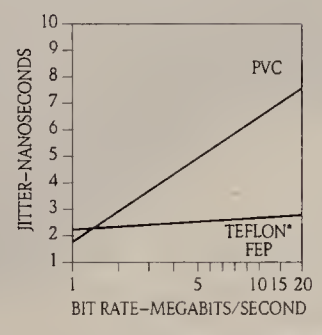

Jitter contribution of 24-gauge twisted pair cables with 6 to 7 mils of insulation.

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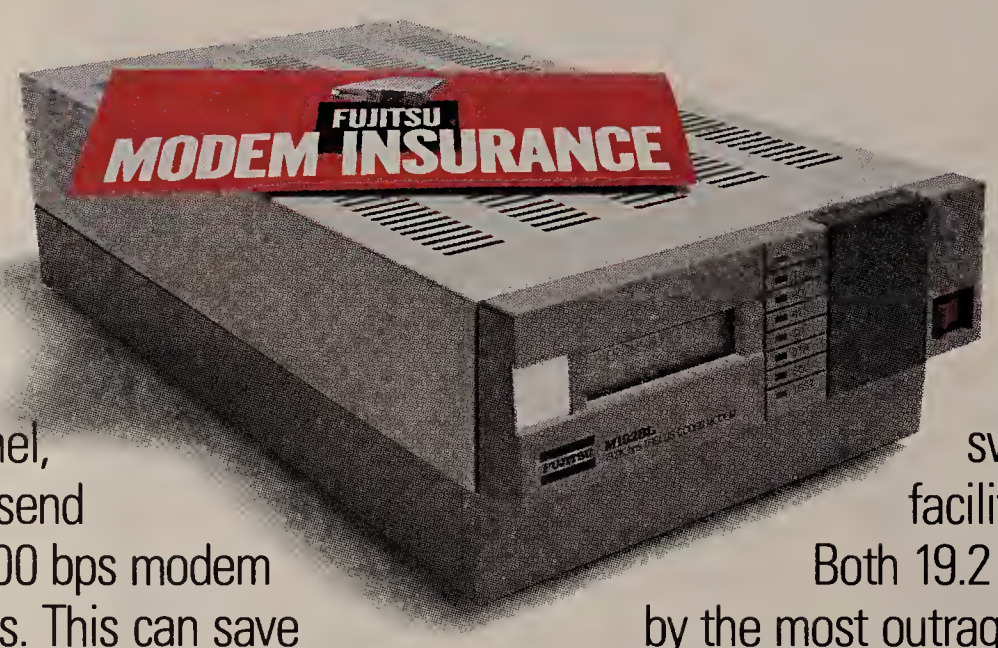

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Carrier Watch

AT&T subsidiary **American Transtech** will operate a nationwide, toll-free consumer information service for the **Maxwell House Coffee Co. of General Foods Worldwide Coffee & International.**

American Transtech officials said calls will be answered by a team of 16 of its employees who have received training about Maxwell House products. The officials said the agreement is rare in that few companies contract for consumer information services.

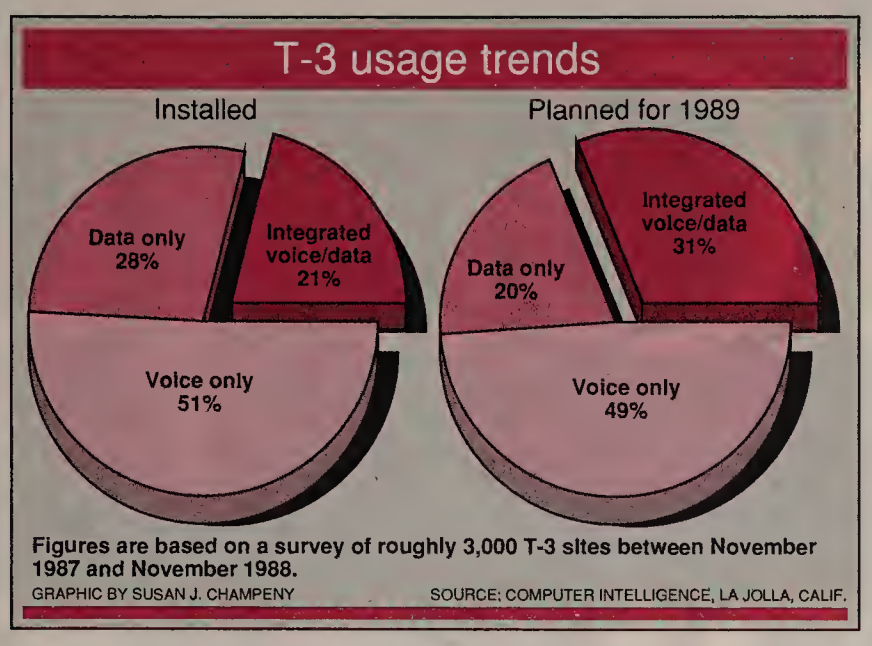
American Transtech, based in Jacksonville, Fla., claims to be the fifth largest telemarketing service bureau in the U.S. Maxwell House is the nation's largest coffee company.

AT&T and **PictureTel Corp.** recently demonstrated what the companies said was the first dial-up, two-way, color, intercontinental videoconference call.

The videoconference between Peabody, Mass., and Paris was made possible using AT&T's Accunet Switched Digital Service and PictureTel conferencing equipment.

The transmission cost about $5 per minute, according to James Posko, marketing manager of AT&T Business Video.

AT&T's Accunet Switched Digital Service, offered in 80 metropolitan areas domestically, is available in France and is scheduled to be offered in the UK.



BellSouth unites telephone services, CPE subsidiaries

RBHC says FCC ruling will allow better service.

By Anita Taff
Senior Correspondent, Washington

WASHINGTON, D.C. — BellSouth Corp. last week announced a new marketing program combining its customer premises equipment sales and telephone services under a single sales and service group.

BellSouth says it is the first of the regional Bell holding companies to take advantage of the Federal Communications Commission's 1987 Third Computer Inquiry decision, which eliminated the need to establish separate subsidiaries to sell customer premises equipment.

BellSouth hopes its one-stop shopping will boost sales of customer premises equipment.

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On Jan. 1, BellSouth folded its equipment subsidiaries, South Central Bell Advanced Systems, Inc. and Southern Bell Advanced Systems, Inc., into its telephone operations.

Customers have been frustrated in buying equipment and telephone services from separate organizations, said Jere Drummond, senior vice-president of marketing at BellSouth. "Customers have made it clear that they want it to be easier to do business with us," he said.

Michael Lane, director of telecommunications for Mississippi State University in Starkville, previewed the combined BellSouth sales force during a trial that began in July. Lane said he sees advantages to purchasing equipment and service from the same organization.

"You spend a lot of time establishing a working relationship with [the telephone] people. Then, when you want a certain piece of equipment, you have to bring someone in from five to 600 miles away who doesn't even know where the university is," Lane said.

The university had encountered problems, for example, when it wanted to integrate a voice-messaging system into the BellSouth central office switch that anchors the school's Centrex service. Regulations prohibited Lane from discussing the system with his Centrex providers.

BellSouth hopes its one-stop shopping concept will help boost sales of customer premises equipment, a highly price-competitive market.

"A number of customers said that the combined environment has been a factor in choosing BellSouth [for customer premises equipment] in Mississippi," Drummond said. The trial was conducted with all multiline business customers in the state and was successful, he added.

Lane agreed that service was an important factor in choosing an equipment vendor. The university must adhere to state procurement regulations and award contracts to the lowest bidder. But Lane said that if it were up to him, he would purchase equipment from BellSouth even if it were priced somewhat higher in order to get the single point of contact for service.

BellSouth also initiated a new service program targeting the 200 largest companies in its region. The RBHC has set up major account centers, where large customers will have a single point of contact for all ordering and maintenance needs.

Tufts U. wiring net carries voice, data

Modular cabling supports Northern Telecom PBX and DEC VAXes to accommodate university, city.

By Jim Brown
New Products Editor

SOMERVILLE, Mass. — When Tufts University renovated a former school building here last year to accommodate university and city administration offices, it took the opportunity to install a unified wiring system to support voice and data.

The contract for the cabling scheme, which supports a newly installed Northern Telecom, Inc. SL-1 private branch exchange and Digital Equipment Corp. VAX minicomputers, was awarded to ensure that Tufts got the wiring system it needed, according to Tony Petrella, an Andover, Mass., telecommunications consultant who was retained for the job.

Besides overseeing the installation of the cable, Petrella managed the installation of the PBX and a computer room for the DEC equipment. Petrella also designed an 18-GHz microwave system supporting 10 T-1 voice links and 18 T-1 data links for communications with the main campus, located a few miles away.

Employees of Somerville that share the building with Tufts are linked to host computers in city hall via a fiber-optic cable installed by Northern Telecom.

Petrella said bids for the wiring component of the project ranged in price from $90,000 to $170,000, with the more experienced wiring vendors bidding in the $100,000 range. The average price per jack for the job ranged from $70 to $100. The university eventually awarded a $130,000 wiring contract to MOD-TAP System, Inc. of Harvard, Mass.

Tufts favored MOD-TAP's products because they were modular, using connectors to plug wires into patch panels and distribution frames. Other vendors' schemes use punch-down blocks, Petrella said.

The modular approach makes it easier to troubleshoot wiring problems or add new wires to an

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WASHINGTON UPDATE

BY ANITA TAFF

Probe AT&T, MCI urges. In a letter to Federal Communications Commission Chairman Dennis Patrick, MCI Communications Corp. last week urged the agency to investigate charges that AT&T has been less than candid in providing information during the FCC's investigation of Tariff 15.

In September, the FCC ordered MCI, US Sprint Communications Co. and AT&T to submit a list of all single-customer network deals in effect after Jan. 1, 1988. MCI said that AT&T's list, which included 12 such arrangements, failed to disclose 35 other offers that were made but not in effect during that period.

AT&T has said it has no single-customer arrangements with the 35 users cited by MCI. However, at least one of the 35 companies, Georgia-Pacific Corp., acknowledged to *Network World* in early November that it had discussed a Tariff 15 arrangement with AT&T. MCI insists the Georgia-Pacific offer must have been made before AT&T submitted its list to the FCC.

In the letter, MCI's Gerald Kovach, senior vice-president of regulatory and public policy, told Patrick that AT&T is challenging the authority and integrity of the FCC by ignoring the information order, and it urged him to demand an explanation from AT&T. Failure of the agency to act on this matter "will embolden AT&T to breach still other [FCC] policies and rules," Kovach wrote.

FCC allows HNS price cut. In other tariff-related matters last week, the Federal Communications Commission granted AT&T's request to reduce rates on its Hospitality Network Service (HNS) from 18 to 16½ cents per minute.

After concluding its investigation, the FCC found nothing "patently unlawful" in the request to warrant a rejection.

AT&T has garnered only one customer, Marriott Corp., for

(continued on page 19)

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MCI Communications Corporation, 1988.

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Tufts U. wiring net carries voice, data

continued from page 15

existing system, he said. The modular plugs enable technicians to pull a wire from a patch panel without harming the wire. Technicians looking for the source of a wiring problem often wonder if they cause additional problems when pulling the wire from a punch-down block, Petrella said.

In the Tufts project, two main distribution frames were installed in the building: one in the PBX room and one in the computer room. Nine wiring closets also were established throughout the building.

Given the chance to plan from the ground up, Tufts chose to run three twisted-pair wires to each office jack. Nine 100-pair cables were run from both main distribution frames to each closet. The nine cables have enough wire pairs to support future needs, Petrella said.

At each closet, the 100-pair cables are broken into four groups of 25 pairs each. Each 25-pair group is connected to the patch panel via a modular connector.

Overall, there were some 500 voice jacks and 500 data jacks in the building. Roughly half of the jacks are designated for future use. The voice jacks use an RJ-11 connector. Data is supported by a Western Electric 6R connector, which is a six-pin connector similar in appearance to an RJ-11, except that the prong on the bottom is off-center. This prevents users from plugging data devices into telephone jacks.

Tufts requested that the wall plates support four separate jacks, two for voice and two for data. The university also requested that only one voice and one data jack be wired initially. MOD-TAP had to specially design the wall plates and jacks to comply with that request.

With extra wire pairs running vertically in the building, Petrella said technicians adding users to the PBX or DEC VAX simply run a three-wire-pair cable from the patch panel to the wall jack.

"This gives you fast response times for changes and high reliability for the users," Petrella said. It also avoids the high cost of running wires from the switch or computer room through the building each time the university wants to add a jack.

"If you don't plan the building correctly, the first new jack [added after the job is finished] could cost you $500," he said. Instead, this design keeps new installation costs down to the price of the cable.

The MOD-TAP wiring plan specifies the use of each wire. The first twisted pair of a voice port, for example, is designated for the voice signal, while the second pair is reserved to power LCD display telephones. The third pair can be designated to support any special PBX feature requiring a dedicated wire pair, such as data transmission.

Some vendors require different wiring allocations to support their PBXs and often tell users that wiring has to be replaced to support a new PBX, Petrella said.

This wiring system is designed to accommodate any vendor's PBX. "The wiring will last as long as the building does," Petrella said. "If you manage your facility well, you don't really care which PBX is coming in. The next time you buy one, you don't [need to] buy the wiring again."

Vendors take sides over RBHC projects

continued from page 11

"[The RBHCs are] not just going to write [the manufacturers] a check and then sit there until the royalty checks start coming in," Casserly said.

Once the RBHCs are allowed to become involved with manufacturers on any level, the industry may be on a slippery slope, he said. The Department of Justice's favorable recommendation was based partly on the understanding that RBHC funding would amount to less than a 5% interest in manufacturing companies.

But Casserly fears it will be difficult to set an arbitrary level of funding once such arrangements are allowed. He pointed out that if the seven RBHCs were each allowed to fund 14.3% of a manufacturer, together they could buy 100% of that company.

In addition to these associations, AT&T and Tandy Corp. opposed the request.

Lawrence Strickling, an Ameritech attorney, dismisses objections to the funding request, saying they are motivated by manufacturers afraid of losing market share. He acknowledged that Ameritech would probably purchase funded products for its own use but insists the company would not act in an anticompetitive manner.

Consent Decree safeguards

Safeguards already exist in the Consent Decree that prohibit the RBHCs from directly designing products, and any discriminatory disclosure of network information to funded manufacturers would be easily detected, Strickling said. He also said that RBHC funding arrangements would drive new technology development, not stifle innovation.

Northern Telecom, Inc., which supports the Ameritech request, sent a letter urging approval to the Department of Justice in August. "Such funding arrangements are necessary to ensure the maintenance and modernization of the nation's telecommunications infrastructure," according to the letter from Eugene Lotochinski, Northern Telecom's vice-president of strategic marketing. "[They] help both small start-up companies and larger established manufacturers such as Northern Telecom bring new network products to market."

"The whole reason [for funding manufacturers] is to get new products developed that we could use in our network," Strickling said. The funding from Ameritech will absorb some of the risk of developing new technologies and thereby allow the manufacturers to move more quickly on development, he said.

Washington Update

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the HNS service, which guarantees users a fixed, discounted rate for all calling periods on 1+ traffic in return for a minimum of four million minutes of use per month. AT&T told the FCC that 18 cents per minute was not a competitive rate and that the reduction was necessary to retain Marriott and win new customers.

Telesphere International, Inc. had asked the FCC to reject the HNS price reduction, claiming that AT&T had failed to show that the service would pay for itself. Telesphere claimed that AT&T has said the service would not be profitable if offered on a widespread basis.

MCI Communications Corp. also opposed the AT&T request, arguing that HNS is actually a single-customer offering for Marriott and that the price decrease was prompted by Marriott's displeasure that rival hotel chain Holiday Corp. was receiving lower rates under a Tariff 15 offering. At press time, an MCI spokeswoman said she did not know if the company would appeal the decision.

Tariff 12 delayed again. AT&T again last week deferred the effective date for its Tariff 12 offering for American Airlines, Inc. The tariff, which would allow AT&T to design a custom network with integrated voice/data services, is now scheduled to become effective Jan. 30. Four other Tariff 12 offerings are under investigation by the Federal Communications Commission, and it has been widely predicted that the American Airlines offer may be included in that investigation.

Covering the country. A report issued by the Industry Analysis Division of the Federal Communications Commission indicates that there were 506 long-distance carriers serving all or part of the U.S. during 1988. Texas had the greatest number of carriers, with 164, and Wyoming had the least, with 12. Figures for the report were compiled from regional Bell holding companies' records on the number of carriers purchasing switched access.

Because Hawaii, Alaska and Connecticut are not served by RBHCs, figures were not available for those states.

The FCC report indicates that only AT&T, MCI Communications Corp. and US Sprint Communications Co. serve all of the other 47 states.

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INTERNATIONAL BRIEFS

TOKYO — Moves to split up **Nippon Telephone and Telegraph Corp. (NTT)** have intensified in industrial and government circles following the involvement of key NTT officials in the Recruit Cosmos Co. insider stock scandal. Those involved include former NTT Chairman Hisashi Shinto, who resigned from the company on Dec. 14.

The Posts and Telecommunications Ministry's advisory council is planning to hold a hearing with NTT officials and firms that want to diminish NTT's near monopoly in domestic telecommunications.

The Ministry of International Trade and Industry and the Fair Trade Commission are expected to present proposals for an NTT breakup. Prime Minister Noboru Takeshita has nominated Takuji Matsuzawa, a vice-chairman of the Federation of Economic Organizations (Keidanren), to replace Shinto as NTT chairman.

TOKYO — **Fujitsu, Ltd.** recently announced that it has started exporting semiconductor lasers and amplifiers for fiber-optic transmission to **MCI Communications Corp.** MCI will use the devices to increase the capacity of its long-distance fiber facilities. Approximately 500 lasers and amplifiers will be installed on MCI's 2,000-km. fiber network by the end of 1989.

AMSTERDAM — **The International Council for Computer Communication** and the **International Federation for Information Processing** will sponsor an Integrated Services Digital Network conference April 25 to 27 in The Hague, Netherlands.

The conference, the first global forum to address ISDN-related tariffs, will address ISDN in Europe, the U.S. and the Far East, and will cover commercial, regulatory and technical issues.

Speakers include: Theodore Irmer, director of the Consultative Committee on International Telephony and Telegraphy for Geneva-based International Telecommunications Union; and Michel Carpentier, managing director of telecommunications and information industries at the European Community Commission.

Edward Boutmy, communications services director at Eindhoven, Netherlands-based Philips Industries, N.V., will chair the conference organizing committee. The Dutch Post, Telegraph and Telephone administration, which became a government-owned company on Jan. 1, will host the conference. Conference cosponsors include the Royal Dutch Engineering Society and the Dutch Association of Information Technology Professionals.

PARIS — **Telephone Cables Ltd.**, the subsidiary of UK-based **GEC-Plessey Telecommunications**, last week inaugurated the first section of a 1,700-km. fiber-optic network linking Bangladesh's railway systems. The $21.4 million project was able to continue despite floods that devastated the country last year. Used for both telecommunications activities and railway signaling, the network will include a microwave radio link with Northern Bangladesh. The network is expected to be completed by 1990. According to Hassan Hamad, head of the country's railway telecommunications, this contract is the first fiber-optic project in Bangladesh.

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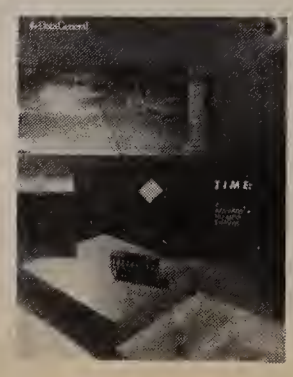

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Worth Noting

In 1986, professional tax preparers electronically filed 85,000 tax returns. By 1992, the Internal Revenue Service estimates that the total will reach 30 million, according to a study by Telenet Communications Corp., a division of US Sprint Communications Co.

Data Packets

AT&T said recently it was awarded a $170 million contract to build half of an undersea fiber cable linking North America with Europe. Also, UK-based **STC PLC** won a $150 million contract to supply a section of the new transatlantic cable system, known as TAT-9, the firm said.

The cable project is being led by a consortium made up of AT&T, British Telecommunications plc and telecommunications groups from France, Canada and Spain. TAT-9, the third transatlantic fiber-optic cable (following TAT-8 and PTAT-1), will link the U.S. and Canada to the UK, France and Spain. AT&T said TAT-9 will carry the equivalent of 80,000 simultaneous conversations when it is completed in October 1991.

The first undersea fiber cable to Europe, TAT-8, went into service Dec. 14, 1988. TAT-8 carries the equivalent of 40,000 simultaneous conversations, AT&T said.

Faced with exorbitant housing costs and periodic housing shortages in certain city areas, Tokyo real estate agents plan to establish an online network that will allow realtors to share information on available living quarters, their prices and locations.

The net, which will link some 30,000 agents, is scheduled to be operational in May 1990. It is aimed at helping agents more readily assist customers in finding housing and in having up-to-date lists of available real estate.

US West NSI enhances net mgmt. software, eases use

Graphic Net Monitor translates info into images.

By John Cox
Senior Editor

BELLEVUE, Wash. — US West Network Systems, Inc. (NSI) recently enhanced its Netcenter Graphic Network Monitor (GNM) for IBM SNA networks by making it more efficient, easier to use and more secure.

The new version of GNM resolves performance problems cited by customers who complained that the software consumed too many CPU cycles to monitor and control networks, according to George Haddix, who took over last August as president of US West NSI, a US West, Inc. subsidiary based here.

GNM translates SNA alert and status information into pictures and diagrams. These images — displayed using icons, windows and a mouse on an IBM Personal System/2 color workstation — let a network operator quickly identify a specific device or link that is failing. GNM also supports several simple network control commands, such as deactivating or reactivating terminals.

GNM was first delivered to customer sites last summer. "Up until about three months ago, we had performance problems with those installations," Haddix said.

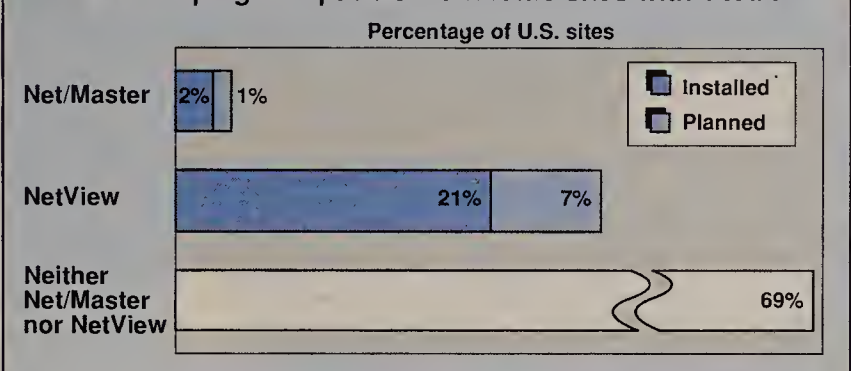
The new release "achieves a significant reduction in CPU utilization," according to the company. One customer with an SNA network supporting 20,000 logical units found that the software required only 5% of the CPU cycles of its IBM 3090-150 host, the announcement said.

Haddix declined to say what the percentage had been prior to the improvements. "It varied from site to site," he said. "In Re-

(continued on page 22)

SNA management software

IBM and plug-compatible mainframe sites with VTAM



Less than one in four SNA sites use either of the two leading SNA net management packages, Cincom Systems, Inc.'s Net/Master and IBM's NetView.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: COMPUTER INTELLIGENCE, LA JOLLA, CALIF.

Gov't picks labs to check for POSIX compliance

By Paul Desmond
Staff Writer

WASHINGTON, D.C. — The federal government is in the process of accrediting the first third-party laboratories to certify products for compliance with the Portable Operating System Interface (POSIX) and other Federal Information Processing Standards (FIPS).

POSIX is an IEEE-proposed standard that defines a common interface between program applications and a Unix-like operating system. In theory, POSIX allows users to port POSIX-compatible applications to any machine running a POSIX-compatible operating system, a capability that would make it easier to port applications to different machines within a network.

The new labs will provide the first formal tests for compliance with POSIX as defined in FIPS 151, according to Roger Martin, manager of the National Institute of Standards and Technology's (NIST) software engineering group. Although FIPS 151 is not mandatory, the government expects its agencies to comply with the standard, which means that vendors will be forced to supply POSIX-compatible products.

Currently, the government has no formal procedure to test products for POSIX compliance, and it is forced to accept vendor claims of POSIX compatibility,

(continued on page 23)

Monthly cost comparisons of fractional T-1

	Line distance in miles				
Line capacity	**1**	**250**	**500**	**1,000**	**2,000**
Full T-1	$5	$8	$11	$17	$29
Half	$4	$6	$8	$11	$18
Quarter	$3+	$4	$5	$7	$11
Eighth	$3	$3+	$4	$5	$7
DS0 (64K bit/sec)	$3	$3	$3	$4	$4

Figures assume a 20% profit for the interexchange carrier. Local access to an interexchange carrier's service office is via the local carrier's loop facilities at the T-1 rate.

SOURCE: GENERAL DATACOMM, INC., MIDDLEBURY, CONN

Fractional T-1 high on many users' lists

Timeplex's add-on card may spur offerings from other vendors for those not needing full T-1 link.

By Paul Desmond
Staff Writer

NEW YORK — As expected, Timeplex, Inc. last week announced an enhancement that enables its Link family of T-1 multiplexers to support fractional T-1 services, an alternative that a number of carriers are expected to introduce by midyear.

Timeplex joins a select group of multiplexer vendors that have unveiled products supporting fractional T-1, which allows users to buy portions of 1.54M bit/sec digital T-1 links ("Timeplex to support new T-1 service," *NW*, Jan. 16).

Analysts expect AT&T, MCI Communications Corp. and US Sprint Communications Co. to offer fractional T-1 service in either this quarter or the next one.

As the name implies, fractional T-1 allows users to buy fractions of a T-1 pipe in various increments, depending on the carrier. The service lets users employ digital facilities to bring into their T-1 backbone sites that could not otherwise justify a full T-1 link.

The service can also be used to back up existing T-1 links or support high-bandwidth applications such as channel-to-channel host links, image transfer and computer-aided design and manufacturing.

Timeplex's offering is significant because the firm has the largest installed base of T-1 equipment, according to Vertical Systems Group, a Dedham, Mass.-based consulting firm ("Mux makers jockey in 'buyer's market,' " *NW*, Jan. 16).

It also indicates that multiplexer makers such as Timeplex will add support for central office-based services as the market for high-end T-1 products reaches its peak within the next year, according to Timothy Zerbiec, a principal at Vertical Systems.

Interfacing

The major long-haul carriers will offer fractional T-1 between their respective points of presence, but customers will have to access the service using a full T-1 pipe leased from local telephone companies.

The customer premises equipment — T-1 multiplexers or channel banks — used to support the service must be able to package the 64K bit/sec DS0 channels within T-1 lines into bundles; these bundles must then be switched as one circuit by the digital access and cross-connect systems (DACS) used by the long-haul carriers, according to Scott Stouffer, senior product manager for Link products at Timeplex.

Timeplex's new Channelized Services Processor module for its Link multiplexers, for example, can bundle DS0s for a single application that requires a total bandwidth of 384K bit/sec. That bundle will be switched as one package by the carrier's DACS, Stouffer said.

Separate bundles of DS0s coming from the same location

(continued on page 22)

Fractional T-1 allows users to buy fractions of a T-1 pipe in various increments.

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US West NSI enhances net mgmt. software

continued from page 21

lease 1.1, we made a major effort to overcome these [performance drawbacks]."

US West NSI announced three other improvements, two of them designed to make the product easier to use and the third to improve its security features.

The company added what it calls a "configuration view," which lets a net administrator click the mouse on a specific device, such as a terminal that will not log on to a host. Then, GNM will display the whole pathway from terminal to host.

Another improvement simplifies the creation of custom displays in addition to those that GNM creates from data drawn from the host's VTAM program.

Finally, the new GNM lets network administrators define more precisely than in the earlier release not only the SNA network domains that net operators can access but also the control commands they can issue in that domain, Haddix said.

The mainframe part of GNM, running under MVS/XA or MVS/SP, captures data on network alerts and status from several IBM programs, including VTAM, Network Communications Control Facility and Network Problem Determination Application. GNM also works with Cincom Systems, Inc.'s NetView alternative, Net/Master.

Pricing depends on the customer's configuration, Haddix said. Prices have ranged from $40,000 to $600,000.

US West NSI is located at 14335 N.E. 24th St., Suite 222, Bellevue, Wash. 98007, or call (206) 644-8400.

Open Software Foundation unveils interface

International News Service

CAMBRIDGE, Mass. — The Open Software Foundation (OSF) recently introduced OSF/Motif, a user interface based on a trio of graphical user interface products.

OSF/Motif, one component of OSF's larger effort to establish a common software environment, draws from products developed by Hewlett-Packard Co., Microsoft Corp. and Digital Equipment Corp.

The interface will enable users of MS-DOS and OS/2 workstations to shift to OSF's Unix-based environment with minimal retraining, according to OSF members. OSF/Motif may be used on a variety of operating systems, including Unix System V and OSF/1, the foundation's forthcoming operating environment.

OSF/Motif combines the three-dimensional appearance of Window Manager developed by HP with the feel of Microsoft's Presentation Manager and an application development kit that was developed by DEC.

OSF will supply complete documentation and extended versions of the HP Window Manager and the DEC User Interface Language to communicate with OSF/Motif. Interim source code for OSF/Motif is scheduled to be available for licensing to foundation members by the end of this month.

In a separate announcement, the foundation announced six new member firms: Ecole Nationale and Superieure d'Ingenieurs Electriciens de Grenoble, Micro Focus, Inc., MIPS Computer Systems, Inc., Omron Tateisi Electronics Co., The Research Institute for Advanced Computer Science and Texas Instruments, Inc.

Fractional T-1 high on many users' lists

continued from page 21

can be routed to different locations, according to Nathan Muller, manager of consultant relations at General DataComm, Inc., which claims to be the first multiplexer vendor to support fractional T-1.

That feature, combined with the fact that voice and data can be sent over the same digital link while maintaining network management support, gives fractional T-1 the look and feel of Integrated Services Digital Network, Muller said.

The pressure's on

Like T-1 multiplexer vendors, carriers will look to provide fractional T-1 service as a way to differentiate themselves from the competition, Zerbiec said. After the first major carrier provides it, competitors will be forced to follow suit.

AT&T, MCI and US Sprint will all offer fractional T-1 by the end of this year, he said.

"Technically, it's possible for them to [offer fractional T-1] today," Zerbiec said. "The problems are administrative, not technical."

The service is already offered by carriers such as Cable & Wireless Communications, Inc. and Lightnet, which are both nationwide long-distance carriers. Although their offerings vary, the basic premise for the service is to provide and charge users for only that portion of the T-1 bandwidth they need.

Cable & Wireless, which claims to be the first carrier to offer fractional T-1, lets users of its Intelli-Flex service lease as many DS0 channels as they need from a T-1 pipe. For this option, users pay significantly less than what the same amount of bandwidth would cost using the carrier's 56K bit/sec digital data service, said Elizabeth Williams, marketing manager for the carrier.

For example, the charge for a single DS0 from Boston to San Francisco offered under Intelli-Flex is $1,861 per month, whereas a comparable 56K bit/sec digital data service link is $3,976 per month. The company also charges a $500 port fee on each end of the link, no matter how many DS0s are active, meaning users realize greater savings by buying more DS0s.

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Tue., Feb. 7, 6:30 a.m.- 6:00 p.m.
Wed., Feb. 8, 6:30 a.m.-11:00 a.m.

Labs will check compliance

continued from page 21

Martin said. Accreditation "is a very important part of the standards process," he said. "If you have a standard that you require conformance to but do not have a way of verifying that [a product] really does conform, the standard doesn't do you a whole lot of good."

So far, six companies have requested information about the lab accreditation process, and Martin said he expects more inquiries. He also said the labs will eventually test for compliance with future FIPSs pertaining to application portability.

For example, a new FIPS expected to be proposed by the end of this month is an extension of POSIX and will be tested in the labs, Martin said.

Last week, NIST was in the process of drafting the final version of the proposed FIPS, which will define shell and tools, or commands and utilities, he said. In addition, a subcommittee of the POSIX group is working on developing FIPSs that define such areas as remote procedure calls and transparent file system access.

> "We need to have it done yesterday; hopefully, it'll be done tomorrow," Martin said.
>
> ▲▲▲

"I expect the same organizations would be accredited to test all those different standards using the different test suites that we've created," Martin said.

Each test suite is a program that exercises the implementation being tested to ensure that all the functional services defined in the FIPS are present.

The POSIX Conformance Test Suite (PCTS), for example, runs between 1,800 and 2,100 tests, Martin said. PCTS will be distributed on tape and then compiled by the lab under the operating system being tested. That operating system must be a version of Unix, such as AT&T's System V, IBM's AIX or Digital Equipment Corp.'s Ultrix, Martin said.

PCTS generates a file of raw data and information on each test run, and that file is later submitted to NIST for review. The lab will certify whether all the tests were passed. Then, after reviewing the lab's findings, NIST will decide whether to issue a certificate of compatibility.

Martin could not give a target date for when the labs will be operating because NIST has run into procedural problems. "We are moving forward as fast as possible," he said. "We need to have it done yesterday; we won't have it done today, but hopefully it'll be done tomorrow."

One company that hopes to become an accredited lab, Gemma Corp. of Arlington, Va., said POSIX testing is a natural extension of its business. Gemma is a software developer and test company that is under contract with NIST to test its complete line of FIPSs, said John Stanton, vice-president of Gemma.

In that capacity, Gemma works with companies such as IBM and DEC, as well as smaller software houses, to test their software implementations for compliance with various FIPSs.

Mindcraft, Inc. of Palo Alto, Calif., which is also trying to become an accredited lab, has developed a POSIX conformance test suite in conjunction with IBM, according to a Mindcraft spokesman. In addition, the company is a research associate with NIST in developing its PCTS, the spokesman said.

A third company, Lachman Associates, Inc., a software systems consulting and development firm based in Naperville, Ill., considers its bid to become a POSIX test lab an important part of its business strategy because it will be better suited to test its OEM clients' products for POSIX compatibility, said Jim Hancock, director of sales and marketing for the company. Hancock said Lachman Associates has been working with versions of the PCTS tapes since early last year.

The other companies that have inquired about becoming accredited POSIX test labs are: the National Center for Information Technology in Manchester, England; Perennial, Inc. of Santa Clara, Calif.; and Unisoft, Ltd. of London.

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Worth Noting

3Com Corp. reported a record $85 million in sales for the second fiscal quarter of 1989, a 46% increase from the corresponding quarter a year before. Net income rose 165%, to $8.3 million, for the quarter, which ended Nov. 30.

Netnotes

Allen-Bradley Co. recently introduced a bridge that enables users to connect Ethernet networks across an IEEE 802.4 broadband network. Called ISObridge, the product provides up to three 10M bit/sec data channels on the broadband cable.

The bridge can determine the location of devices on a network and decide whether a message should remain on one segment of the network or be broadcast to other segments. Also, the product can extend the distance between Ethernet networks up to 12 miles. The bridge operates at the data-link layer, which enables users to connect Ethernet networks from different vendors. Pricing was not available at press time.

Allen-Bradley can be contacted at 1201 S. Second St., Milwaukee, Wis. 53204, or call (414) 382-2000.

Proteon, Inc. has established a wholly owned subsidiary in Singapore to sell and service its local-network and token-ring internetworking products in the Asian/Pacific region.

The subsidiary, Proteon Networks Ltd., will serve as a product support center for Proteon distributors and value-added resellers in 14 areas, including Australia, New Zealand, Southwest Asia, Japan, India and Western Asia, according to Nate Kalowski, vice-president of marketing.

Kalowski said the new subsidiary will enable Proteon to offer quicker and better service to its end users in the region and to capitalize on the product beachhead it has established there.

Start-up's product heralds arrival of net computing

Display favors all-purpose hosts over net servers.

By Laura DiDio
Senior Editor

MOUNTAIN VIEW, Calif. — Start-up Network Computing Devices, Inc. this week will usher in a new form of local networking when it unveils a display station that favors general-purpose hosts rather than dedicated local network servers.

With NCD16, the company is heralding a form of communications it calls network computing.

In that environment, heterogeneous multivendor hosts — including minicomputers, supercomputers and workstations — are linked via Ethernet local networks into a single integrated system, providing all the capabilities that dedicated network file servers offer today.

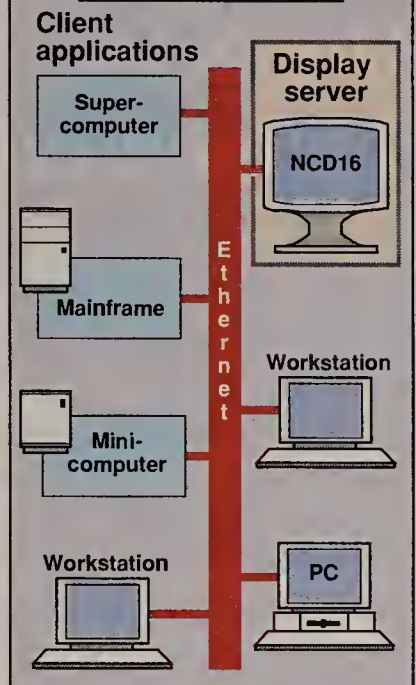
Users in a network computing environment have access to any of the hosts by using workstations, personal computers or Network Computing Devices' network display stations to communicate with hosts. The company said its device is the most efficient user terminal in local networking.

The NCD16 is a diskless, stand-alone display that packs a Motorola, Inc. 68000 microprocessor along with custom circuitry to create advanced graphics.

Unlike other local net devices, the NCD16 performs no application processing. Instead, it routes application processing to the appropriate host, reserving its own 1M-byte memory for graphics and windowing manipulation.

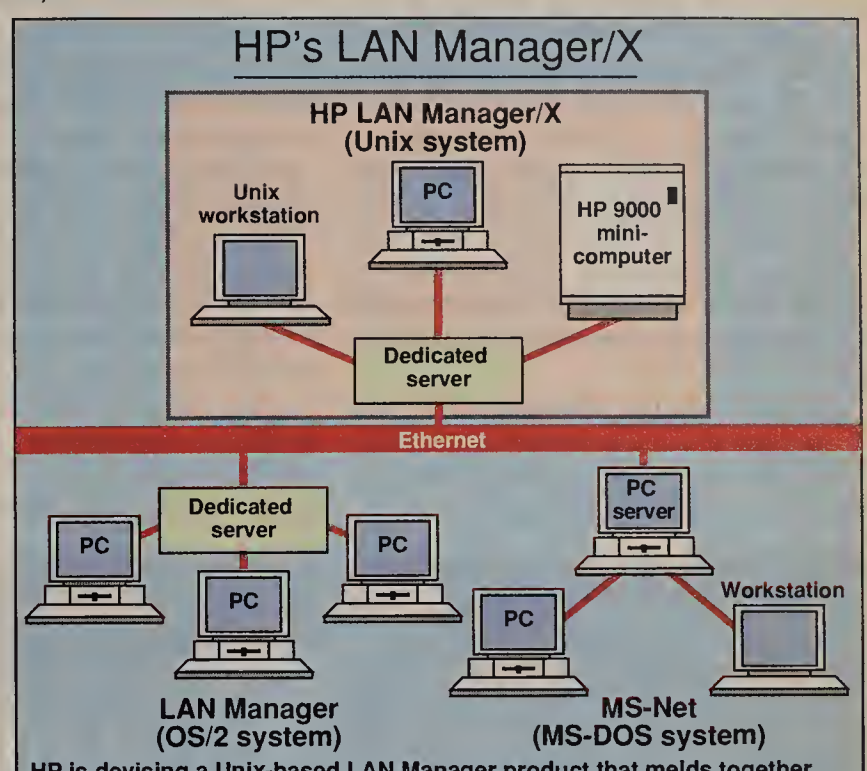
The long-term impact of network display stations such as the NCD16 will not be to displace or replace diskless workstations in the networking market. Rather,
(continued on page 26)

NCD's place in the network



Network Computing Devices' new display will make it possible to off-load processing to back-end hosts.
SOURCE: NETWORK COMPUTING DEVICES, INC., MOUNTAIN VIEW, CALIF.
GRAPHIC BY SUSAN J. CHAMPENY

HP's LAN Manager/X



HP is devising a Unix-based LAN Manager product that melds together MS-DOS, OS/2 and Unix environments.
GRAPHIC BY SUSAN J. CHAMPENY SOURCE: HEWLETT-PACKARD CO., PALO ALTO, CALIF.

HP pegs LAN Mgr./X as industry standard

Joint development arrangement with Microsoft improves offering's stature in Unix environment.

By Laura DiDio
Senior Editor

PALO ALTO, Calif. — Through its joint development agreement with Microsoft Corp., Hewlett-Packard Co. is hoping to position its HP LAN Manager/X as the industry standard Unix implementation of LAN Manager network software.

When released, HP LAN Manager/X will complement the company's OS/2-based implementation of LAN Manager, dubbed HP LAN Manager, that was unveiled last week.

HP LAN Manager/X will support network-attached devices running under OS/2, MS-DOS and Unix. Both HP's Unix- and OS/2-based versions of LAN Manager will run on the company's Series 3000 and Series 9000 minicomputers, as well as on other HP processors running as servers on 10M bit/sec Starlan and Ethernet nets.

Unlike AT&T, which will also roll out a Unix version of LAN Manager later this year, HP will not support a 1M bit/sec version of Starlan in HP LAN Manager/X ("AT&T prepares Unix version of LAN Mgr.," *NW*, Jan. 16).

HP LAN Manager/X will initially support the Transmission Control Protocol/Internet Protocol. In the future, the company will add extensions to enable HP LAN Manager/X to run on nets using the International Standards Organization's Open Systems Interconnection protocols.

HP LAN Manager/X, due out in the fourth quarter, is being developed with Microsoft, according to Joe Bonner, HP's product line manager for HP 9000 Unix systems. The product will incorporate all of the features and functionality of Microsoft's OS/2 LAN Manager.

Once HP LAN Manager/X is ready, Microsoft will license the product to Unix system vendors. With Microsoft's support and promotion, HP expects HP LAN Manager/X to become a de facto industry standard that will be employed by a range of vendors.

Like AT&T, HP is working to meld the best of both the OS/2 and Unix worlds: the multiuser and advanced security capabilities of Unix and the simplicity of the OS/2 LAN Manager interface.

And like AT&T's product, HP's offering will allow its current users to retain their investment in the more mature MS-Net-based networks, the forerunner of today's LAN Manager.

HP LAN Manager/X will allow OS/2 and MS-DOS-based personal computers to access files on a Unix server and on peripherals attached to that server, such as disks, printers and plotters. In addition, HP will maintain the Unix security mechanisms.

HP LAN Manager/X will run on a number of machines. Devices that can be configured as servers include: HP9000 Unix systems; Series 300 processors, which include workstations and minicomputers; and high-end HP-PA Series 800s, which are the Precision Architecture Reduced Instruction Set Computing processors.
(continued on page 51)

LANMARKS

BY LAURA DIDIO

Virus threat mandates legislation, stiff penalties

"If you can't do the time, don't do the crime" is a popular aphorism among law enforcement officials.

Unfortunately, there's no law currently on the books to send the authors of computer viruses, worms, Trojan Horses or logic bombs to jail for any length of time, nor is there any law that would levy any significant civil penalties against the perpetrators.

Yes, in 1986 Congress did pass the Computer Fraud and Abuse Act, which makes it a crime to knowingly gain access to any government computer without proper authorization and to impede its ability to function. The statute also makes it illegal to modify, destroy or disclose information obtained from unauthorized entry into a computer. Additionally, many states have enacted legislation against computer-related theft and fraud.

So why then are computer virus writers and hackers plying their trade with relative impunity?

Plain and simply, the laws as written are so porous that the worst offenders slip through the criminal justice net. Consider the fact that Cornell University graduate student Robert Morris Jr., who allegedly authored the worm that invaded the Internet
(continued on page 51)

Start-up's product heralds arrival

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said Network Computing Devices President and Chief Executive Officer William Carrico, "The real market for this product is to replace ASCII and IBM 3270 terminals." Those devices lack the sophisticated windows management and graphics capabilities that the NCD16 offers.

In addition, the company's concept of network computing will put renewed emphasis on minicomputers as servers, thus offering an alternative to dedicated local network file servers.

Carrico is betting that the NCD16 will bring a new dimension to local networking and open up a niche between terminals and high-end diskless workstations.

Network Computing Devices is packaging several networking standards into one box rather than offering them as individual options. The NCD16 unit, for instance, will run X/Windows software, providing a common user interface to workstations, servers and other hosts residing on a local network. It will also come with its own built-in network interface card, which users typically have to add in to workstations and personal computers.

The display unit will also bundle Transmission Control Protocol/Internet Protocol software support into its structure, permitting the NCD16 to communicate with multivendor devices across the network.

The NCD16 will feature advanced graphics capabilities, including bit-mapped graphics and 1024-by-1024 pixel screen resolution. Those features will make the display especially well-suited for computer-aided design and manufacturing as well as business graphics applications.

Unlike other local network devices, the NCD16 actually manages the graphics on the display while the application is running elsewhere on the network. The NCD16 will not, however, run applications locally.

"It actually accesses computer servers running applications elsewhere on the network," Carrico said. This, he said, is the fundamental reason why an NCD16 is a display station rather than a workstation.

According to Carrico, the NCD16 will provide users with all the productivity advantages of workstations, such as the X/Windows user interface.

But at a list price of slightly less than $3,000, the NCD16 is much more affordable than high-end diskless graphics workstations. High-end models, such as those made by Sun Microsystems, Inc., Apollo Computer, Inc. and Hewlett-Packard Co., typically cost from $6,000 to $10,000.

"Until now, if users wanted to have the advantages of a window-oriented interface with bit-mapped graphics, they had to pay about $10,000 to get it, or go without and use a standard ASCII terminal," Carrico said.

"Users have been shackled with the user interface equivalent of a teletype machine: one line at a time and character-oriented. Because of their inherent speed and performance enhancements, network display stations will completely change the way users communicate with host computers," he said. "An ASCII terminal can only draw ASCII characters; it can't do any graphics, and it can't have multiple windows."

The NCD16 has been in beta test at 22 sites since November, and Network Computing Devices already has an order backlog for the device, Carrico said, although he declined to give specifics.

For now, the NCD16 is targeted at the scientific and engineering communities.

"That's because the enabling technology, X/Windows, is most widely implemented in the Unix market. But there's nothing inherent in the X/Windows standard that ties it to Unix," said Judy Estrin, Network Computing Devices' executive vice-president.

Carrico and Estrin say they believe they can sell 3,500 network display station units per month in the scientific and engineering marketplace based on the current market for terminals and workstations.

Bridge's behind them

Carrico and Estrin have a good track record when it comes to predicting industry trends. In 1981, Carrico, Estrin and Eric Benhamou, currently vice-president and general manager of the Software Products Division at 3Com Corp., launched Bridge Communications, Inc. to develop bridges and gateways to link disparate networks. In 1986, Bridge earned $8 million on sales of $46 million; it merged a year later with 3Com Corp. In June 1988, Carrico and Estrin left 3Com and shortly after joined Network Computing Devices.

Buoyed by his success with Bridge, Carrico was able to sell venture capitalists on the network display station technology. He secured $5 million in financing by making just two phone calls last July. A second round of financing of between $5 million and $10 million is scheduled for this spring and will be used to get the NCD16 into high-volume production, Carrico said.

Initially, Carrico said, network display stations could change the way companies utilize their workstations.

"I think a lot of users will end up using their workstations literally as computer servers on the network, which will be accessed by network display stations," Carrico said.

Over the next few years, the network display station will move more toward mainstream commercial applications, such as software development, information retrieval, office automation, computer-integrated manufacturing and desktop publishing, Estrin stated.

"It's already starting to happen. [Digital Equipment Corp.'s] DECwindows is based on [X/Windows], and it will soon be available on the Ultrix and VMS operating system environments, and they're both sold into the commercial marketplace," Estrin said.

Worth Noting

Sen. Fritz Hollings (D-S.C.) will speak on global networking at the International Communications Association's Winter Conference to be held Feb. 7 to 10 in Arlington, Va. As chairman of the Senate Commerce, Science and Transportation Committee, Hollings is the highest ranking senator overseeing domestic telecommunications legislation.

Association Watch

The **International Telecommunications Users Group,** a London-based group of users from multinational corporations, and the **International Telecommunications Union,** an arm of the United Nations, are cosponsoring a conference on international networking called **Usercom 89.** The conference will be held March 15 to 17 in Amsterdam.

Usercom 89 will be hosted by the Netherlands Post, Telegraph and Telephone administration. Slated are discussions about regional and global regulation, as well as implementation of X.400 and X.500. Scheduled speakers include Theo Irmer, director of the Consultative Committee on International Telephony and Telegraphy, Peter Allen, from the London office of American Express Co., and George McKendrick, executive director of the International Telecommunications Users Group.

Attendance at the conference costs roughly $500 (depending on the exchange rate). For more information, write to Usercom 89 Secretariat, c/o International Telecommunications Union, Place des Nations CH-1211 Geneva/20, Switzerland.

Tips for electronic data interchange use

- **Anticipate customer pressure.** Many companies have been or will be forced by their customers to use EDI. Early on, businesses must build a strategy for dealing with this.
- **Construct a business case.** Even though EDI may be forced on a firm, companies must take the time to measure its financial, organizational and technological impacts.
- **Obtain top management support.** EDI should be viewed as a fundamental change to the structure of a business. For this reason, it must be championed at the senior executive level.
- **Do a pilot test first.** Just as with any large technical effort, organizations must thoroughly pilot-test EDI before implementing it on a large scale.

SOURCE: TRANSPORTATION DATA COORDINATING COMMITTEE/ELECTRONIC DATA INTERCHANGE ASSOCIATION, ALEXANDRIA, VA., AND GARTNER GROUP, INC., STAMFORD, CONN

Rushing into EDI may lead to future redesign costs

Report says firms coerced by trading partners into adopting EDI may skip necessary analysis.

By Wayne Eckerson
Staff Writer

ALEXANDRIA, Va. — Few companies properly plan for implementation of electronic data interchange (EDI) and, as a result, many will spend thousands of dollars in the future to redesign their EDI systems, according to a recently released report.

Most users are coerced into implementing EDI systems by large trading partners. Consequently, they neglect to undertake an in-depth analysis of the technical, managerial and financial issues involved in implementing EDI technology, according to the report, entitled "25 Key Issues In EDI: Challenges for Users and Vendors."

The 22-page report poses important questions for communications managers to consider when buying and implementing EDI systems for their companies.

> Firms that sidestep EDI planning may wind up with systems that will be costly to upgrade.
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Although companies may be forced into using EDI, they can still benefit from the technology, the report said.

But cost savings and other benefits can be realized only if companies formulate a strategy for using and implementing EDI and only if they conduct a pilot test before proceeding with larger initiatives.

The report was written by David Taylor, an EDI consultant at Gartner Group, Inc., a market research firm in Stamford, Conn. It was based on his work with EDI users during the past three years. The report was jointly sponsored by Gartner Group and the Transportation Data Coordinating Committee/Electronic Data Interchange Association (TDCC/EDIA), based here.

TDCC/EDIA coordinates the efforts of major industry groups to develop and implement EDI standards.

A reactive application

"EDI is still largely a reactive application dictated by customers and managed as a response to external requirements, rather than as part of a business system," Taylor said in the report.

Companies that sidestep thorough EDI planning may wind up with multiple, incompatible EDI systems in different departments that will be costly to integrate and upgrade, or incompatible with the company's overall networking architecture, he wrote.

The report addresses a wide range of issues, including gaining support from top management, negotiating agreements with trade partners and third-party providers, maintaining data security and selecting appropriate EDI standards and applications.

In addition, the report raises questions about how managers can position their EDI systems to prepare for future applications that integrate EDI with electronic mail and electronic funds transfer.

Gartner Group and TDCC/EDIA are using the report as the foundation for an in-depth study on the current and future use of EDI by companies in the U.S. and Canada.

According to Taylor, the study will examine EDI use by several thousand companies.

Data will be gathered to determine whether claims made in the initial report were correct and to answer many questions the re-

(continued on page 30)

Firms drop rivalry to gain advantage

Alliances for purchasing equipment, services can lead to savings if competitive mistrust is set aside.

By Barton Crockett
Senior Editor

Competitors that team up to build networks or buy communications products and services can reap big savings, but participation in such joint projects can also open up a Pandora's box of problems.

For years, users in such industries as financial services and the airlines have banded together to get volume purchase discounts or to share the expenses of major network projects.

The savings from network partnerships can be enormous. For example, late last year the Securities Industry Association (SIA), which represents some of the nation's largest brokerages, contracted with New York Telephone Co. for a fiber-optic voice net to serve its members. The 16 member brokerages expect to save $15 million over five years on a contract worth about $35 million ("N.Y. Tel awarded contract to build securities network," *NW,* Dec. 26/Jan. 2).

The 77 insurance companies that are members of Insurance Value Added Network Services (IVANS) receive discounts as high as 48% on services from IBM's Information Network, as well as 5% to 9% discounts on their monthly MCI Communications Corp. telecommunications bills.

Yet, despite such benefits, few prospective partnerships ever get off the ground.

"It's very difficult to strike these kinds of deals," said Allan Kolb, systems director with the brokerage firm A.G. Edwards & Sons, Inc. in St. Louis. "People who generally compete find it hard to work together."

The problems that arise are numerous. For instance, although they often having common needs that could be met through a joint net, competitors are suspicious of sharing sensitive communications technology.

And the negotiations needed to put together a partnership can

(continued on page 30)

GUIDELINES

BY ERIC SCHMALL

Book by Bush media guru falls short

You are the Message: Secrets of the Master Communicators, Roger Ailes with John Kraushar (New York: Dow Jones-Irwin, 1988), $19.95.

Network managers today increasingly need to be skilled communicators. A manager's value to his company is often measured more by how well he sells communications technology to upper management and end users than by how that technology is implemented.

With that in mind, upwardly mobile communications managers might want to steal a page from President George Bush's campaign playbook to learn how they can quickly develop an effective communication style.

If they do choose to use Bush as a model, they would be ill-advised to buy the new book written by the president's media guru, Roger Ailes, who helped transform Bush's public image from wimp to winner.

The book purports to teach readers how to do the same; in practice, though, it falls far short.

In the book, Ailes outlines what he considers the basic elements of successful speaking. One's communication ability is based on a composite of personal assets that includes "physical appearance, energy, rate of speech, pitch and tone of voice, animation and gesture, expressiveness of eyes and the ability to hold the interest of those who listen to you."

(continued on page 30)

Schmall is network systems manager for an insurance holding company.

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The right choice.

Rushing into EDI may lead to future costs

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port raises. The study is scheduled to be published early this summer.

EDI recommendations

The report recommends that companies considering EDI establish an ad hoc group composed of interested employees to analyze the issues, benefits and costs of EDI before installing a system.

This group might assess the external forces pushing the company to implement EDI, the use of EDI in competing companies and the ability of trading partners to use EDI.

The group might also make a formal recommendation to top management for an EDI budget and a project team to supervise the implementation of EDI systems and to coordinate strategy.

"Even though EDI may be forced on a company, this is no excuse for failing to measure its financial, organizational and technological impact on the company," the report said.

The project team should include representatives from marketing, manufacturing, distribution, purchasing, finance, legal and information systems, according to the report.

The project team must ensure that its EDI strategy meshes with the company's business goals and technology strategy.

"Aligning EDI with the corporate technology strategy is critical because information technology is changing rapidly and EDI systems could be outmoded before they are implemented," according to the report.

In addition, the project team should pilot-test an EDI system at the departmental level before urging top management to approve the use of EDI throughout the corporation. A successful pilot increases the likelihood that management will allocate additional funds for new EDI systems, the report said.

MIS too technology-oriented

Because of the growing complexity of EDI systems, many companies are giving greater responsibility to MIS for implementing EDI systems. However, the report warns that MIS leaders may be too focused on technology and not fully aware of the business or organizational issues associated with implementing EDI.

EDI can reduce costs and perhaps give a company a competitive advantage in the marketplace, but companies must aggressively pursue a well-thought-out EDI strategy, the report said.

Copies of the report may be obtained by contacting Robert Watkins Jr., director of education at TDCC/EDIA, 1101 17th St. N.W., Suite 712, Washington, D.C. 20036, or by calling (202) 293-5514.

Book by Bush media guru falls short

continued from page 27

Had Ailes chosen to develop these concepts further, his book would have been valuable. He does not, however, and instead simply rehashes old ideas.

For instance, his list of essentials for master communicators is: Be prepared, be committed to the idea or topic, make your audience comfortable and be interesting.

These are secrets? No, and neither are his later exhortations to be mindful of eye contact, body language and diction.

His priorities are also hard to understand. He devotes an entire chapter to "energy" but only a few scattered paragraphs to nonverbal communication.

This choice is particularly perplexing because he cites a University of California at Los Angeles study that found that nonverbal communication delivers roughly 55% of a speaker's message to his audience.

To improve oratorical style, Ailes suggests that readers watch themselves speak on videotape. His firm tapes clients and asks them to view the tape and prepare a self-critique.

Ailes points out that his clients are almost always wrong in their self-diagnoses — being either too harsh or too lenient. Only after Ailes and his staff take a professional look at the tapes can accurate critiques be prepared.

If self-diagnosis among his clients is usually unreliable, how can the reader hope to avoid the same pitfall? Ailes offers no clue.

Unsubstantiated assertions

The book contains numerous assertions that "research has shown" or "studies have demonstrated," such as: Business leaders call the ability to communicate the key to success; seven out of 10 people who lose their job do so because of personality conflicts; and people start building lasting impressions about new acquaintances within seven seconds of meeting them.

Yet Ailes fails to cite sources for these claims. This critically diminishes his authority.

If Ailes does introduce anything worthwhile, it is in the book's final chapters about dealing with the media. Here he offers insights into how to handle interviews and how to give fair and even-tempered responses to hostile questions.

He also gives helpful guidelines on how to dress and conduct oneself in televised conferences.

On balance, however, *You are the Message: Secrets of the Master Communicators* contains few secrets.

Surely a man who could engineer such a successful media turnaround for George Bush must have real knowledge of what makes a person an effective communicator. Unfortunately, Ailes doesn't communicate that knowledge in this book.

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Firms drop rivalry to gain advantage

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be complex. Terms of the agreement must be carefully spelled out so that no partner feels shortchanged.

Users experienced with partnerships say some of the difficulties can be alleviated if participants focus on relatively simple contracts and make sure that no one party comes out a loser.

One user who supports this claim is Peter Vainius, vice-president in charge of communications at Drexel Burnham Lambert, Inc. in New York. Drexel is one of the firms involved in the voice network partnership struck up by New York brokerage companies.

Vainius offered some guidelines for establishing partnerships with competitors.

"First," he said, "the participants must have a common goal. It must be a win/win situation for the companies involved and not one in which one firm has an edge over another.

"Next," he said, "[participants must] realize that the more clear-cut the contract and plain vanilla the services involved, the simpler it will be to put together."

As an example, Vainius cited the SIA's contract with New York Telephone. The deal covers only direct-dial telephone lines connecting a trader to a select number of clients in New York. Vainius called this arrangement straightforward and added that working with this level of service made it much easier for the participating firms to come to an agreement.

Even so, he said, it was difficult to persuade the participants to put up $10,000 each to get the project started.

Negotiations that brokerage firms have undertaken for other, more complex projects, have fallen through, Vainius added, largely because the issues involved were too complex for the firms to reach a consensus.

But some network partnerships arise despite the complexity of the task. Such is the case with the nonprofit Arinc Co. operated by the major domestic airlines.

Annapolis, Md.-based Airinc operates a data center that, among other tasks, moves reservation data from one airline reservation network to another. This transfer of information is necessary when a customer books flights through a competing airline's reservation system.

Because of the complexity of interconnecting reservation systems, the airlines agreed to turn the job over to a neutral third party.

"Can you imagine the battles if airlines connected their reservation systems directly," said Dan Sassi, vice-president for administration at Airinc. "Since we're owned by each of the airlines, we can do this without any real risk of bias."

Still, many firms are reluctant to work with rivals because they do not want to relinquish the competitive advantage they feel they gain from running their own nets.

The IVANS partnership has struggled with that issue. Currently, firms in the group pay a onetime membership fee ranging from $7,500 to $56,000 and monthly dues ranging from $5,000 to $30,000, depending on company size.

The exact savings member firms gain from IVANS varies depending on how much they spend on communications, but they can be substantial. For instance, one company that pays a monthly fee of $5,000 to IVANS saved $14,000 last month on its MCI bill, according to Ken LaClair, IVANS manager of communications services.

Despite the potential for big savings, LaClair said large insurance firms are reluctant to substitute IVANS services for the huge proprietary networks they already operate.

"They have invested enormous sums in their nets, and they think they get an edge from them," LaClair said. "The larger firms are beginning to pull away from this [and join IVANS], but only slowly."

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

Worth Noting

See inside for:

- Eight-channel data switch that works like a mux
- Interlan network adapter board for twisted pair
- Two modems that enable transmission over fiber-optic cable

First Look

Executone releases analog key systems

Executone Information Systems, Inc. recently announced two analog electronic key phone systems and two feature enhancement packages for new and existing phone systems.

The **Encore CX 5/12** and **Encore CX 36/112** key systems are designed for small and midsize businesses. The systems consist of attendant consoles and a key service unit that controls the transmission of voice and data information to CX phones.

The Encore CX 5/12 supports as many as 12 phones and five telephone lines. The Encore CX 36/112 supports up to 112 phones and 36 lines. Telephones in these systems come with a 33-button console and an LCD display screen.

Executone's **Feature Package V** includes more than 35 features and can be used with either the new Encore CX 36/112 system or the existing Encore CX 36/72 system. Feature Package V supports remote administration and programming, which allows the data base in a user's phone system to be modified from a remote location, and off-network call forwarding, which enables a user to forward calls to a location outside the company's phone system.

Executone's **Feature Package III** contains 15 features that can be added to the existing Encore CX 8/16 phone system. Feature Package III supports automatic save and redial, which automatically redials busy lines. It also supports a dial memo feature, which en-

(continued on page 32)

Micom adds products to X.25 lineup

SIMI VALLEY, Calif. — Micom Communications Corp. last week bolstered its X.25 product line with the introduction of a new net management system and a pair of packet assembler/disassemblers that support IBM's Synchronous Data Link Control protocol.

The company also released software that enables IBM Personal Computer users attached to Micom's Instanet data switch to automate the process of connecting to other Instanet-attached devices. In addition, Micom rolled out a voice digitizer that enables its statistical multiplexers to transmit packetized voice.

Micom's X.25 Network Management System (XNMS) consists of a board and software for Intel Corp. 80386 microprocessor-based IBM Personal Computer ATs running Xenix. The board is used to link the Personal Computer AT to local or remote Micom and non-Micom X.25 packet switches via an X.25 connection operating at speeds up to 64K bit/sec.

XNMS features include:

- The ability to configure Micom and non-Micom X.25 switches and PADS from a central site and retrieve network performance data.
- The ability to support a map of the X.25 network that displays the status of X.25 network nodes and links in real time, including alarm conditions.
- The ability to merge X.25 network call-accounting data collected from each X.25 node into Lotus Development Corp.'s Lotus 1-2-3 spreadsheet applications.

The price for XNMS, which does not include the Personal Computer AT, is $15,000. XNMS is expected to ship in February.

Micom also announced a Dual Protocol SNA PAD/Protocol Converter that enables asynchronous terminals to access IBM Systems Network Architecture hosts via X.25.

The board-based product is for Micom's Box Type 3, which sup-

(continued on page 33)

Cabletron bridges connect variety of Ethernet cables

By Jim Brown
New Products Editor

ROCHESTER, N.H. — Cabletron Systems, Inc. recently announced a pair of Ethernet bridges for linking Ethernet segments that use different cabling schemes.

The NB20E and NB25E bridges connect Ethernet segments using thick or thin coaxial cable, twisted-pair wiring or fiber-optic cable. The bridges enable users to build Ethernets that exceed the distance limitations and maximum number of users designated by the Ethernet 802.3 standard. The bridges also isolate heavily used Ethernet segments from other parts of a local network.

The bridges operate at the data-link layer of the International Standards Organization's seven-layer Open Systems Interconnection model. This means a computer attached to a coaxial-cable Ethernet running Digital Equipment Corp.'s DECnet or Transmission Control Protocol/Internet Protocol can be linked via the bridge to a twisted-pair Ethernet running the same protocols.

Both products read packet addresses on both sides of the bridge to determine when packets should be shuttled across, a process called filtering.

The NB20E uses software to filter packets at 8,700 packet/sec and forwards packets at 5,800 packet/sec. The NB25E uses a board to filter 15,000 packet/sec and forwards packets at 10,000 packet/sec. The NB20E can store as many as 2,048 addresses, while the NB25E can store as many as 8,191 addresses.

Both units support a feature that deletes addresses from the filtering table when devices have not transmitted packets for a user-defined period of time. This helps alleviate problems if an Ethernet device is moved from one segment of the network to another.

The bridges also support the Spanning Tree Algorithm, which is used in networks with multiple bridges to ensure that packets do not continuously flow between bridges when the destination device cannot be located.

Lastly, both bridges support Cabletron System's LanView network management scheme, which uses a series of front-panel LEDs to inform users if the bridge is operating, whether it is receiving or transmitting packets, or whether it has detected packet collisions.

The NB20E costs $2,995, and the NB25E costs $5,495.

Cabletron Systems can be reached by writing to P.O. Box 6257, Rochester, N.H. 03867, or by calling (603) 332-9400.

V.32-compatible modems released

Digicom's low-end unit sports a price hundreds below other offerings.

By Jim Brown
New Products Editor

SANTA CLARA, Calif. — Digicom Systems, Inc. is expected to introduce this week a low-end CCITT V.32-compatible modem that costs $795.

The 9624LE's price is several hundred dollars lower than that of other V.32 modems on the market, and it is half the cost of Digicom Systems' high-end V.32 offering, the 9624E.

The 9624LE operates in full-duplex at speeds up to 9.6K bit/sec over dial-up and two-wire leased lines. In addition to V.32-compatibility, the 9624LE supports the 2,400 bit/sec CCITT V.22bis standard as well as Bell 212A and 103J standards.

The modem is capable of adjusting its transmission speed to the top speed of the receiving modem. In addition, the 9624LE supports Microcom, Inc.'s Microcom Network Protocol (MNP) error-checking and data compression techniques. This enables the modem to achieve throughput of close to 19.2K bit/sec, depending on line conditions.

MNP data compression replaces repetitive bit streams with codes that the receiving modem can translate.

The 9624LE supports Hayes Microcomputer Products, Inc.'s AT command set, which enables it to work with a wide array of asynchronous communications software. The modem, which has front-panel LEDs that display modem status, also supports synchronous data transmission and the full set of CCITT V.54 loop-back diagnostic tests.

Contributing to the 9624LE's low cost is a Digicom Systems proprietary design that uses one microprocessor to support both transmit and receive functions. Other modems require microprocessors for each function, a spokesman said.

The 9624LE also supports five fewer features than the company's 9624E. Those features are support for four-wire leased-line operation; dial backup recovery for leased-line circuits; configuration via a front-panel LCD and keypad; the ability to configure remote modems from a central site; and support for the CCITT V.25bis autodialing standard.

Digicom Systems can be contacted at 2374 Walsh Ave., Santa Clara, Calif. 95051, or call (408) 727-1277.

Codex line supports Hayes' enhanced AT command set and MNP.

CANTON, Mass. — Codex Corp. recently upgraded its line of CCITT V.32-compatible modems to support Hayes Microcomputer Products, Inc.'s enhanced AT command set and Microcom, Inc.'s error-checking protocols.

Operating in full-duplex mode at 9.6K bit/sec, the new 2264 and 2266 models are designed to replace Codex's earlier V.32 offerings, the 2250 and the 2260.

The enhanced AT command set lets the modems work with a wider range of asynchronous communications software, and support for the Microcom Network Protocol (MNP) enables the modems to support error correction when communicating with other MNP V.32 modems.

Available in stand-alone or rack-mounted versions, both the 2264 and 2266 support asyn-

> The new models are designed to replace Codex's earlier V.32 offerings.
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chronous and synchronous data and can operate over dial-up as well as two- or four-wire leased lines. The 2250 and 2260 operate over dial-up or two-wire leased lines only.

Other enhancements included with the 2264 and 2266 are support for the CCITT's V.25bis autodialing protocol and a dial backup feature that establishes a dial-up connection when leased lines fail. Both new modems also feature an enhanced echo cancellation technique.

In addition to V.32 compatibility, both new modems support CCITT V.22bis and V.22, as well as Bell 212A standards. Both modems also support the CCITT's full set of V.54 loop-back diagnostic tests and can simulate half-duplex operation when connected to data terminal equipment requiring half-duplex modems.

The 2264 is designed for use in the U.S, and the 2266 is designed to operate with the telecommunications networks of various countries. The 2266 is

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First Look

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ables a user to store important numbers on the phone system during a phone conversation.

The phone systems and feature packages are available now from Executone dealers and distributors throughout the country. Prices vary from region to region.

Executone Information Systems, Inc., 6 Thorndal Circle, Darien, Conn. 06820, or call (602) 998-2200.

Eight-port data switch also acts as multiplexer

CBM Electronics, Inc. recently introduced an eight-channel data switch that can also function as a multiplexer.

Called the **Remote Distribution Unit 01 (RDU01),** the product supports eight RJ-45 serial ports and one RJ-11 port. Used as a data switch, the RDU01 provides links among as many as eight asynchronous devices, such as terminals, printers, personal computers, modems and host computers. These links are provided over twisted-pair wire at speeds up to 38.4K bit/sec.

Used as a multiplexer, an RDU01 links eight remote asynchronous terminals to an asynchronous host located more than half a mile away at speeds up to 38.4K bit/sec. The multiplexer function supports full-duplex transmission over two twisted-pair wires between the RDU01 and the asynchronous host. Configured as a multiplexer, the RDU01 supports asynchronous terminal connections at speeds up to 19.2K bit/sec.

The RJ-11 jack also enables users to provide a twisted-pair wire link between multiple RDU01s. Using CBM Electronics' PortNet master switching configuration, users can build a data-switching network of as many as 32 RDU01s, supporting a total of 256 serial ports.

Available now, the RDU01 is priced at $495.

CBM Electronics, Inc., 160 McCormick Ave., Costa Mesa, Calif. 92626, or call (714) 241-8194.

Interlan announces twisted-pair net adapter

Interlan, Inc. recently unveiled a network adapter board that enables IBM Personal Computers to be attached to networks using any shielded twisted-pair wiring scheme.

The **NI5210-STP** board enables Personal Computers to act as file servers or nodes attached to twisted-pair wire Ethernets operating at the full 10M bit/sec data rate.

Equipped with a SynOptics Communications, Inc. LattisNet transceiver chip, the board supports wiring runs of up to 100 meters. The board uses a nine-pin connector to link the Personal Computer to the twisted-pair wiring. Four LEDs indicate power, as well as receive and transmit operation and status.

The NI5210-STP has either 8K or 16K bytes of random-access memory, as well as diagnostic routines to verify that it is operating properly.

The device supports software for a variety of network operating systems.

Available now, a version of the NI5210-STP with 8K bytes of RAM costs $495.

Interlan, Inc., 155 Swanson Road, Boxborough, Mass. 01719, or call (508) 263-9929.

Seiko unveils fiber short-haul modems

Seiko Instruments U.S.A., Inc. recently announced two limited-distance modems that support transmission over fiber-optic cable.

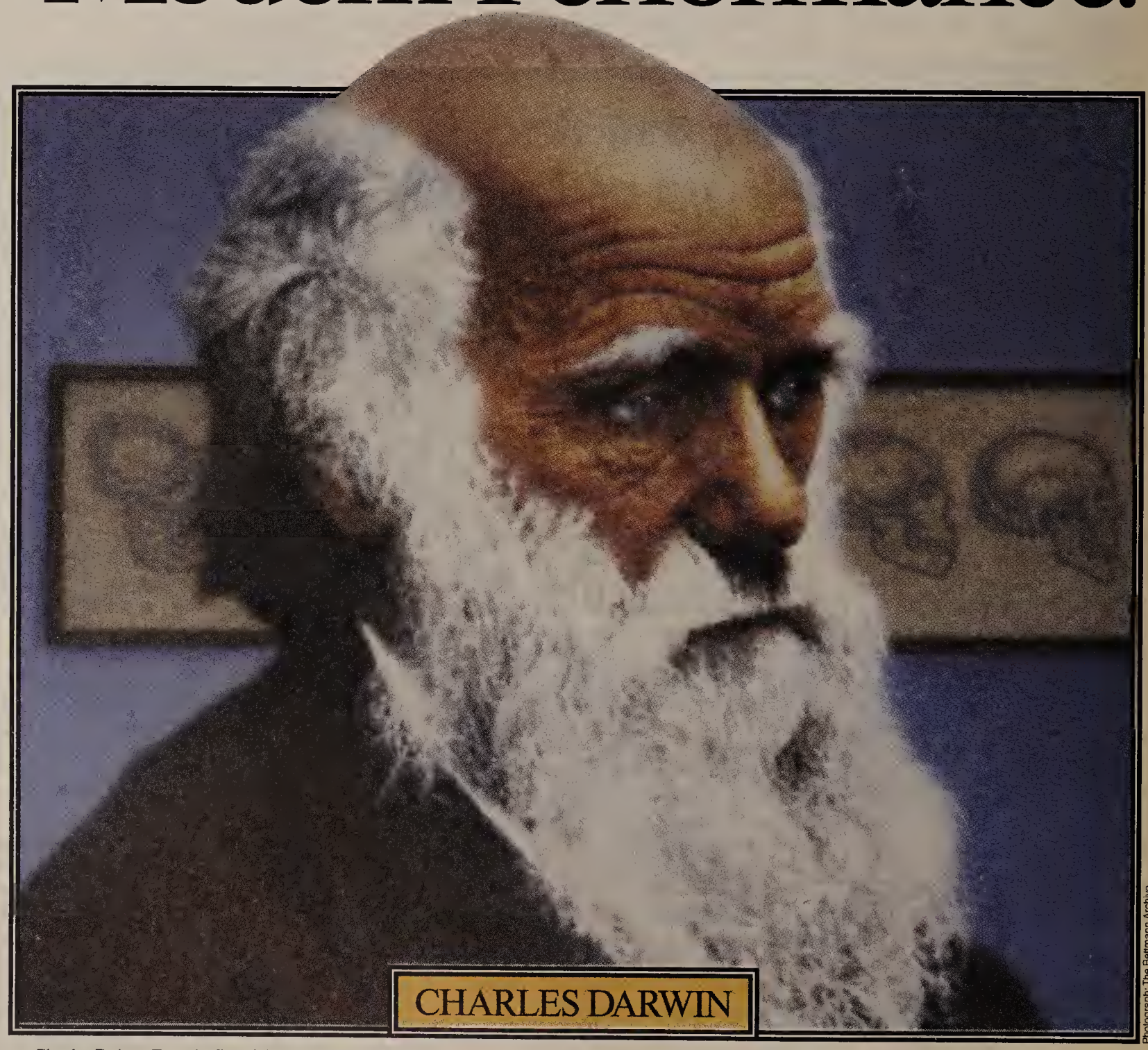
The **SFC-1210** and **SFC-1110** modems transmit data over distances up to 1¼ miles on fiber cable. Both modems support automatic line checks and error diagnostics.

The SFC-1210 supports speeds up to 10K bit/sec. It adheres to the IEEE General Purpose Interface Bus standard used on such data terminal equipment (DTE) as host computers, communications controllers and test equipment. The modem does not require software changes on the DTE.

The SFC-1110 supports data communications among host computers, workstations and peripherals.

The modem supports asynchronous communications at speeds up to 20K bit/sec and syn-

We Redefined The Evolution Of 2400bps Dial-Up Modem Performance.



Photograph: The Bettmann Archive

Charles Robert Darwin, English naturalist, 1809-1882. His comprehensive treatise, *On the Origin of Species* (1859)—and his later work, *The Descent of Man*—fundamentally changed the field of natural history. The broad ideas of the Darwinian principle of Natural Selection became the basic elements of virtually all evolutionary theory for the next 100 years.

chronous communications at speeds up to 19.2K bit/sec. The unit supports both full- and half-duplex transmission, and it conforms to EIA RS-232-C and CCITT V.24/V.28 standards.

Available now, the SFC-1210 modem costs $1,240, and the SFC-1110 modem costs $650.

Seiko Instruments U.S.A., Inc., 2990 West Lomita Blvd., Torrance, Calif. 90505, or call (213) 530-8777.

Codex line supports MNP

continued from page 31

currently undergoing compatibility tests in 20 countries.

Both new modems use an adaptive rate technique that allows them to adjust their speed to compensate for line problems. In synchronous mode, the modems use a message displayed on a front-panel LCD to inform users of the speed at which they should be configured. In asynchronous mode, the modems automatically adjust their speed.

Both modems are configured via a front-panel keyboard and LCD. Nonvolatile memory on both modems can store up to four user-defined configurations, four Codex-defined configurations and up to nine frequently dialed telephone numbers.

The 2264 costs $1,695, which is $300 less than the existing 2260. A Codex spokesman said the 2260 will be discontinued later this year, and he said Codex also plans to release another V.32-compatible modem supporting fewer features later this year. The 2266 sells for $1,900.

Codex can be reached by writing to Maresfield Farm, 7 Blue Hill River Road, Canton, Mass. 02021, or by calling (617) 364-2000.

Micom adds to X.25 lineup

continued from page 31

ports a mix of Micom PAD and multiplexer boards. The PAD/converter comes in two versions, one supporting as many as 10 asynchronous ports and one supporting four asynchronous ports and three SDLC ports.

The integral protocol converter on both boards converts asynchronous data to SDLC, which is then wrapped in an X.25 packet and transmitted via an X.25 network to the IBM host site.

In addition, either version of the Dual Protocol SNA PAD/Protocol Converter supports X.25 connections between asynchronous terminals and asynchronous hosts.

The Dual Protocol SNA PAD/Protocol Converter supports a single X.25 trunk operating at speeds up to 72K bit/sec and either RS-232, V.35 or X.21 interfaces. A version supporting four asynchronous and three SDLC ports sells for $6,750. A version supporting 10 asynchronous ports costs $8,000.

Another new board-level PAD for Micom's Box Type 3 is the SNA PAD, which concentrates up to four multidrop or point-to-point SDLC lines into one X.25 trunk operating at up to 72K bit/sec. It supports interactive 3270 traffic over X.25 and can be used to link 5250-type cluster controllers to IBM System/3X minicomputers via X.25.

An SNA PAD supporting four SDLC lines and one X.25 trunk costs $4,100.

Micom's new PCXchange software (PCX) runs on IBM Personal Computers attached to its Instanet data switches. With PCX, users can write scripts that allow them to enter a single menu-driven command to create connections between the Personal Computer and other Instanet-attached devices, including asynchronous host computers, printer and modem pools, and other Personal Computers.

Users are typically required to issue a series of commands when creating connections to other Instanet devices. A single-user version of PCX costs $75.

Micom's Advanced Packetized Voice 1/DLC (APV 1/DLC) is a stand-alone unit that is attached to a tie line and a port on a Micom statistical multiplexer. The product digitizes voice at 9.6K bit/sec, 12K bit/sec or 14.4K bit/sec using a Micom proprietary algorithm. This enables users to establish voice links over a composite statistical multiplexer link. The product can be used to replace dedicated voice circuits between data centers, for example.

APV 1/DLC is priced at $1,250.

Micom Communications Corp. can be reached by writing to 4100 Los Angeles Ave., Simi Valley, Calif. 93063, or by calling (805) 583-8600.

Just as Darwin influenced the world by redefining creation as Evolution, Racal-Vadic is redefining the world's perceptions of dial-up performance. Our introduction of new data compression technology is pushing the evolution of 2400bps modems to all new levels of throughput.

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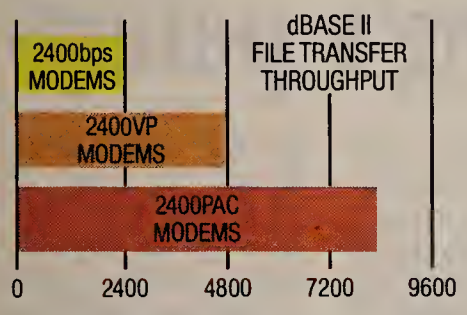
As the leading supplier of error-control modems, we know how important standards are. From CCITT and Bell, to Hayes® and MNP,® to our own SADL,™ Synchronous Auto Dial Language. We've been driving the development of business application modems since the origins of the industry, and nobody offers more compatibility with the high performance standards of today and the even higher standards of tomorrow.



Benchmark results show relative throughput performance of the 2400VP and 2400PAC compared to ordinary 2400bps modems.

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Our price/performance leader, the 2400VP, comes with MNP Class 5 data compression. Giving it twice the throughput of ordinary V.22*bis* modems. It also comes with MNP 2, 3, and 4 error control, for error free data over any phone line. Plus Hayes compatibility, and an exclusive set of Racal-Vadic performance and diagnostic features. A rack mount version, the VA4224E, offers the same features for central site applications.

Our top-of-the-line 2400PAC advances performance a whole generation. In addition to everything found on the 2400VP—including MNP 5—it comes with CommPressor,™ the data compression standard of tomorrow. Which can boost V.22*bis* throughput rates up to 9,000bps.

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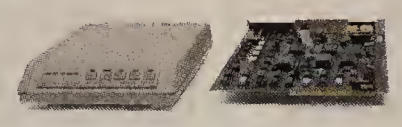

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OPINIONS

TCP/IP

BY JOHN MCQUILLAN

TCP/IP popularity may prevent OSI progress

The Transmission Control Protocol/Internet Protocol, originally developed by the Department of Defense as part of the Advanced Research Projects Agency Network (ARPANET) in the mid-1970s, is virtually the only universal solution for computer-to-computer connectivity. Although Open Systems Interconnection protocols are widely recognized as the long-term solution for interoperability, software implementing them is not yet available for most computers. Users perceive TCP/IP as the only game in town. Ironically, it may be so successful that it delays the implementation of OSI by many years.

TCP/IP has seen phenomenal growth in popularity among users in the last few years. It has become the Rosetta stone of the information systems business. The original requirement for TCP/IP was to link host computers on diverse wide-area networks having different packet sizes, error-control procedures and performance characteristics. Shortly after its development, it became clear that it would also be an important tool for linking host computers on local networks.

> Fundamentally, users don't care about standards; they want results.
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During this same period, researchers at the Xerox Palo Alto Research Center developed Ethernet, and other research labs were carrying out experiments in packet radio and other innovative network systems. TCP/IP became an important standard within the ARPANET community because it enabled communications across these vastly different environments.

Because TCP/IP is not a proprietary solution and because implementations of the protocol were available in the public domain, it was adopted by many Ethernet vendors.

Another factor in the popularity of TCP/IP has been the commercial success of Unix. As a result of the research initiative in wide-area networking, local-area networking and internetworking, it was a natural step in the evolution of Unix to include TCP/IP in the base software system. The University of Berkeley's Unix Version 4.2 BSD software release, including TCP/IP, was shipped to thousands of sites. Many resellers of Unix systems then incorporated TCP/IP into their products.

But what about OSI? The International Standards Organization has developed the TP4 specification, which is not very different from TCP/IP. Implementations are said to be forthcoming soon.

But, fundamentally, users don't care about standards; they want results. Users that have gone to great efforts to make two TCP/IP implementations on different computer systems work together are understandably reluctant to change to OSI. In the end, the most difficult problem is likely to be that TP4 doesn't offer new functionality; instead, it offers ideological purity at additional implementation expense. When it comes to linking different computer systems together, however, the important issue is connectivity, not ideological purity.

TCP/IP provides excellent connectivity between dozens of different computers and workstation systems. TCP/IP terminal servers, local- and wide-area network routers, and mainframe systems are the glue that will connect future networks. If TCP/IP provides all the sticking power that is needed, then it may retard the acceptance of the true OSI protocol stack.

Although slow to arrive at commercial maturity, TCP/IP may be even slower to depart from the scene.

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning future communications systems.

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EDITORIAL

Management misses the bus on telecommuting's potential

As this decade draws to a close, it's becoming possible to accomplish more and more of our daily tasks electronically. There is electronic banking, electronic messaging, electronic shopping and even electronic commuting, better known as telecommuting.

None of these phenomena has grown as quickly as predicted when the technologies that support them were first announced. But telecommuting remains the most glaring example of a valuable technology-driven management tool that managers have failed to exploit.

The idea was that telecommuting workers would leave traffic jams behind and work via computer from their own snug "electronic cottages." Thanks to telecommunications technology, they could work productively from home, and their employers would need much less office space to support them.

Unfortunately, while telecommuting has expanded significantly within a few forward-thinking organizations (J.C. Penney Co., Inc. and the state government of California are examples), many managers still don't feel comfortable unless they can keep tabs on bodies and time clocks.

According to Gil Gordon, president of Gil Gordon Associates, a telecommuting consulting firm in Monmouth Junction, N.J., the number of telecommuters in U.S. companies has barely managed to double over the past five years. That's surprising because many new technologies that make telecommuting easier and more efficient have come into widespread use during the same period of time. Personal computer-based facsimile boards, sophisticated modems and communications software, voice-messaging systems and a host of other connectivity tools are widely available, and their cost is dropping rapidly.

One factor that may induce managers to experiment with telecommuting is the tight high-tech labor market. A telecommuting arrangement, Gordon observes, may enable a company to attract scarce technologically expert workers or to keep experienced employees who might otherwise leave because they want to move to a different geographical area.

> What will drive broader acceptance of telecommuting? Low-cost, full-motion videoconferencing might help.
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Managers may be resisting telecommuting for no other reason than they've developed misconceptions about it. Telecommuting is not necessarily a five-day-a-week arrangement; Gordon says most telecommuting arrangements today are set up so that the employee spends two, three or four days working at home and then comes to the office for the balance of the week.

What will drive broader acceptance of telecommuting during the 1990s? Availability of low-cost, full-motion videoconferencing might help. But technology isn't the main problem. Most telecommuting tasks can be supported quite efficiently with a 2,400 bit/sec personal computer, a modem and a public-switched telephone line.

The obstacle that's keeping telecommuting on the back burner is the same one that slowed the acceptance of electronic mail: habit. It's becoming a bit more acceptable to work at home, but most people are still in the habit of thinking that it isn't work if it doesn't get done at the office.

That school of thought seems certain to change as more and more travelers discover that laptop computers enable them to work from their hotel rooms while they're on the road. And conventional commuting is becoming more distasteful as urban gridlock worsens.

Telecommuting will never be a panacea, but it is a valuable management tool that can be used in conjunction with other, related management tools, such as flex time and job sharing, to make organizations more productive.

OPINIONS

INFORMATION SERVICES

BY ROBERT STEARNS

RBHCs' claims to just dessert could inhibit information age

Eating dinner with a child at the table can be exasperating. A child who wants ice cream but is instead given brussels sprouts will often boycott the meal altogether. While such irrationality might be expected from children, the regional Bell holding companies are exhibiting similar behavior in the information services arena.

Like children who are not allowed to eat ice cream for dinner, the RBHCs are currently prohibited from consuming whatever markets they want. They are limited to information transmission and other closely related services, but are constantly seeking to lift these restrictions and enter areas such as manufacturing and information content generation.

The RBHCs bring no unique expertise to these pursuits, and, in addition, their local network monopolies provide a means by which they could discriminate against their competitors. In the information services area, the RBHCs' form of "boycott" consists of a halfhearted pursuit of open network architecture.

The RBHCs' reluctance to let independent information service providers connect to their networks clearly stems from the RBHCs' desire to act as service providers themselves. But a review of today's information services industry suggests that the RBHCs do not have the expertise to compete.

The information age is by no means purely a future phenomenon. Today, there are a number of established, sophisticated information service providers. The largest of these provide access to an array of data bases.

Some of the more prominent information service providers are CompuServe, Inc., Dialog Information Services, Inc., Dow Jones Information Service Group and Mead Data Central. Smaller but more numerous are the informational data bases such as Lexis and transactional data bases such as SABRE.

Very few of the successful service providers began merely from a technology base. The publishing industry is perhaps the most dominant force in the information services market. Dow Jones was in the business of gathering, synthesizing and distributing information long before the term "information service" was coined. The on-line Official Airline Guide is produced by the same company that publishes the hard-copy version.

The public sector, too, has been an important contributor to the current mass of on-line data. Dialog was commissioned by the National Aeronautics and Space Administration (and implemented by Lockheed Corp.) in the 1960s to accelerate the flow of technical information throughout the aerospace industry. Lexis began as a project of the Ohio Bar Association. And activity by government agencies, universities and associations has made a wealth of other data available.

> The RBHCs must abandon their dream of becoming information generators.
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Service providers in many industries have entered the on-line transaction market. American Airlines, Inc. has made SABRE a very profitable component of its airline business. Brokerage firms such as Charles Schwab & Co., Inc. allow their clients to retrieve stock information and trade securities through their on-line services.

CompuServe, which started as a time-sharing service, has its roots in technology. However, the company has not become an information generator; it has grown within its role as an information distributor. If technological expertise alone were sufficient to become an information service provider, the market would be dominated by the likes of IBM, Digital Equipment Corp. and the unregulated carriers.

A role for the RBHCs?

The RBHCs cannot compete as information service providers. However, they can and must play a vital role in advancing the information age by expanding access to information services from the domain of specialists to that of the public at large. The RBHCs can accomplish this by providing simple access methods for both voice and screen.

Because they already have an account set up with virtually every home and business on the map, the RBHCs can also perform billing functions on behalf of the information service providers.

In return for providing their unique slice of the information services value-added chain, the RBHCs would receive substantial revenues from increased network usage and from the services they provide to the information service providers. But in order to reach profitable volumes, the RBHCs must abandon their dream of becoming information generators in favor of being information carriers.

Who suffers?

When children refuse to eat their dinner, they are the only ones who suffer. But when the RBHCs refuse to accept a critical and profitable position in information services, we all suffer. No other organization can step in as effectively to serve the RBHCs' common carrier function. There have been some bright spots, such as Bell Atlantic Corp.'s recent agreement to offer Telenet Communications Corp.'s electronic mail. In general, though, the RBHCs' efforts at courting information service providers have been lackluster.

By opening their networks to information service providers, the RBHCs will bring the immediate benefit of new services. More importantly, such an opening will enable the RBHCs to finance and hasten the development of a telecommunications infrastructure that will support even more services. To date, the progress toward Integrated Services Digital Network and other network modernization has been painfully slow. This lethargy endangers our country's competitive position.

It is useful to recall that Dialog, the first on-line data base, was created in the 1960s to help our country meet the demands of the space race. Today, we are caught in an equally important race to remain competitive in a global economy. We can ill afford to let our information resources lay idle by dissipating our efforts and shutting out the most capable providers.

Stearns is vice-president of corporate marketing at Codex Corp. in Canton, Mass.

TELETOONS

BY FRANK AND TROISE

and another thing . . .

Robust. It's a word that makes sense when applied to a tankard of English ale. But just what is a robust network? You know, the kind you heard about at that last trade show.

Your odyssey began when you edged up to a booth, snatched a brochure and moonwalked away in a style that would've made Michael Jackson proud.

But you were too slow, and a boothee caught up with you: "Let me tell you about our latest announcement!"

You countered that gambit by glancing at the brochure and thinking up a quick question: "What does this mean, exactly, when it says 'robust?' "

After peering at your badge to make sure you represented a Fortune 500 company, the boothee coaxed, "If you'll just step over here, our director of marketing will be glad to answer your question!"

OK, you didn't feel like you'd just won $5 million in the lottery, but you were getting closer to the truth. You posed your question to the marketing man. "It means 'fault-tolerant,' " he replied.

"Yeah, right," you thought. "And that means . . . ?"

Your footwork was even faster the second time. Once you were safely into the flow of aisle traffic, you wadded up the brochure and sent it to join its brethren in one of the robust trash bins on the exhibit floor.

THE TRUTH MAY BE BITTER, but it never hurts the teller. In fact, in your case, it could work very much in your favor. All you need to do is write a guest column for *Network World's* Opinions pages.

Columns should be timely, opinionated, literate, thoughtful and accurate.

Manuscripts should be letter-quality, double-spaced and between 600 and 900 words in length. Disk or modem submissions are preferred.

If you'd like to write a column, contact Steve Moore, features editor, *Network World,* Box 9171, Framingham, Mass. 01701, or call (508) 820-2543, ext. 732.

Everybody's talking

Looking ahead to 1992, Europe is planning a digital cellular radio network that users throughout the continent can access.

CONTINUED FROM PAGE 1

the network throughout Europe from a range of standard voice/data terminals installed in "mobiles" such as cars and trucks. A large number of manufacturers will offer a range of network-compatible terminals, which should help to keep prices down.

A mobile ISDN

This pan-European system will essentially be a mobile Integrated Services Digital Network. Europe has something of a world lead in ISDN. Numeris, the ISDN network officially inaugurated on Nov. 29 by French Post, Telegraph and Telephone Administration Minister Paul Quiles, is already in commercial service in Paris and Brittany, and will be available nationwide by 1991. But cellular radio has not yet caught on in Europe as it has in the U.S.

Cellular radio, however, is about to go through a boom phase in Europe, at least according to Mike Pinches, managing director of Orbitel Mobile Communications Ltd., a Basingstoke, England-based equipment supplier. Cellular radio is "the future of telecommunications," he says.

Pinches estimates that, by 1999, 3% of Western Europe's population of 300 million will be using digital cellular radio. This works out to nine million subscribers. On a per-subscriber basis, he expects terminal costs to be down to approximately $670 by 1999, while infrastructure costs will be somewhat lower at $600.

These figures must be compared with those for analog systems currently used in Europe. For example, Scandinavia (Finland, Sweden, Norway and Denmark) has the highest density of cellular radio users relative to population, whereas the UK's subscriber count is by far the largest in absolute terms.

Indeed, the total of more than 300,000 subscribers to the two analog cellular radio networks in the UK is more than five times that of a comparable country such as France (with a total of 50,000 to 60,000 subscribers) and four times West Germany's total (70,000).

Moreover, terminal equipment is expensive. A handset in France, for example, currently costs as much as $5,000, and an analog handset cannot be used on more than one national network. In the smaller European countries, this would be roughly equivalent to a New Yorker being unable to use his mobile phone after crossing the state line into New Jersey.

Digital technology

Against this background, European telecommunications carriers have recently prepared to implement the next generation of cellular systems, based on digital transmission and switching techniques. This is opposed to the tried-and-tested analog technology used by systems such as the UK's Cellnet and Vodaphone, France's Radiocom 2000 and Scandinavia's NMT 900.

Of course, digitization carries with it a need for standardization, as the world computer industry has discovered at its own expense. And thereby hangs a tale. Getting Europeans to cooperate on anything, whether political, cultural, military or, as in this case, technical, requires individual countries to surrender a certain amount of national sovereignty. And this is something European nations are still loath to do, despite the ambitious and much-publicized plans for a single European market in 1992.

Nevertheless, the PTTs of 17 European countries — Norway, Sweden, Finland, Denmark, Ireland, the UK, Belgium, the Netherlands, West Germany, France, Switzerland, Austria, Portugal, Spain, Italy, Greece and Turkey — managed to get together in the Groupe Special Mobile (GSM), set up by the Brussels-based Conference Europeenne des Postes et Telecommunications (CEPT). The working acronym GSM is used to refer to both the Groupe Special Mobile organization and the digital cellular radio network project.

As a consequence of Prime Minister Margaret Thatcher's deregulation policy, the UK has two cellular radio carriers: Cellnet, a subsidiary of privatized British Telecom International, Inc., and Vodaphone, a subsidiary of Racal Electronics PLC, a Bracknell, England-based electronics and military systems firm that also co-owns equipment supplier Orbitel.

Other European countries, in which telecommunications is historically a state monopoly, have not yet emulated the UK's deregulation policy, although countries such as France and West Germany are paying lip service to the idea, and the Netherlands' PTT was deregulated as of Jan. 1. Thus, a total of 18 carriers are participating in the pan-European digital cellular radio network project.

Technical cooperation

On Sept. 7, 1987, 13 of the 18 carriers signed a Memorandum of Understanding and announced plans to implement at least one preoperational digital cellular network; the remaining five are "active observers." The object of the 13 carriers was to select, in cooperation with equipment vendors, the technologies necessary for implementing throughout Europe a homogeneous high-performance infrastructure to support the future pan-European digital cellular radio network.

Under the sponsorship of Brit-

Boult is chief technical editor with the GEID Press Agency in Paris.

ish Telecom, Racal Electronics and the UK's Department of Trade and Industry, Cellnet coordinates the GSM's permanent headquarters housed in Paris by France Telecom.

"Our objective is to satisfy long-term demand for advanced mobile telecommunications services," says Bernard Mallinder, former director of operations at Cellnet. (Mallinder now works at British Telecom.)

In this respect, the GSM system allows not only digital voice transmission and ISDN access but also 'roaming,' by which each mobile can be accessed through the same telephone number wherever it is in Europe — from Marseilles to Stockholm, from Amsterdam to Vienna — with complete security of data transmission."

Transmission security can be ensured, for example, by scrambling data in much the same way a high-end modem does. Indeed, the CCITT V.33 modem recommendation includes a standardized scrambling algorithm that could easily be implemented on an all-digital system such as GSM.

System architecture

System architecture includes, for each region in which GSM operates, a fixed Mobile Switching Center to which stationary Base Stations are connected. An external interface on the Mobile Switching Center enables connection to existing digital circuit- and packet-switching networks, while internal interfaces connect the Mobile Switching Center to the Base Stations and the stations to the mobiles.

The Mobile Switching Center/Base Station interface has been completely defined, using CCITT Signaling System 7 and 30B+D, 64K bit/sec per-channel digital transmission. Up to four compressed 13K bit/sec communications links can be supported by each channel.

The features of the radio interface between Base Stations and mobiles are extremely important because they define the GSM system's capacity in a given area. High capacity involves the use of radio transmitters in very close proximity to one another, which in turn means high interference. One solution to this problem is to randomize interference by commanding the mobile to change channels up to 217 times per second. These parameters allow 124 radio carriers in the CEPT paired band (890 to 915 MHz, 935 to 960 MHz) with frequency hopping.

Each radio carrier is time-division multiplexed, and a basic frame consists of eight time slots. This allows transmission at 270.83K bit/sec, with each bit having a duration of 3.7 microseconds. Modulation is accomplished by Gaussian Minimum Shift Keying.

As shown in the table on page 38, the advanced data communications services provided to users by the GSM system can be compared with those provided by ISDN.

Probably the most spectacular innovation introduced by the GSM system is the roaming feature, which allows a mobile to be electronically located relative to the pan-European network, regardless of where the mobile is

(continued on page 38)

ILLUSTRATION ©1988 CHRIS DEMAREST

(continued from page 37)
when a call is made. Moreover, the switching computers used to route calls to the mobile are programmed to ensure caller authentication and network security.

Digital cellular radio not only allows simultaneous voice and data communications with mobiles, it also has a transmission capacity two to 10 times higher than analog systems for the same radio frequency bandwidth.

Therefore, the introduction of digital technology should help to relieve congestion on the airwaves in densely populated areas such as the centers of London and Paris. The problem is less acute in West Germany, where, according to the Bundespost's Gunther Bruchmuller, the mixed digital/analog "Funktelefonnetz C" (Radio Telephone Network C) cellular radio system will have adequate capacity until at least 1991.

On Feb. 29, 1988, the GSM sent out about 3,000 pages of common technical specifications to a total of 92 equipment suppliers. These suppliers were compiled from a list of vendors chosen by each carrier (the participating equipment vendors are not necessarily headquartered in Europe). Soon afterward, each of the 13 carriers sent out requests to their preferred suppliers for quotes on preoperational networks to fit these specifications.

Digital differences

An unprecedented level of cooperation among European PTTs has accompanied the herculean task of standardizing specifications.

In addition, the main equipment suppliers have formed several rather surprising consortia. The problems involved are not only technical and commercial but also political.

First, the digital switching technology necessary to support the GSM system is at various stages of implementation in the participating countries.

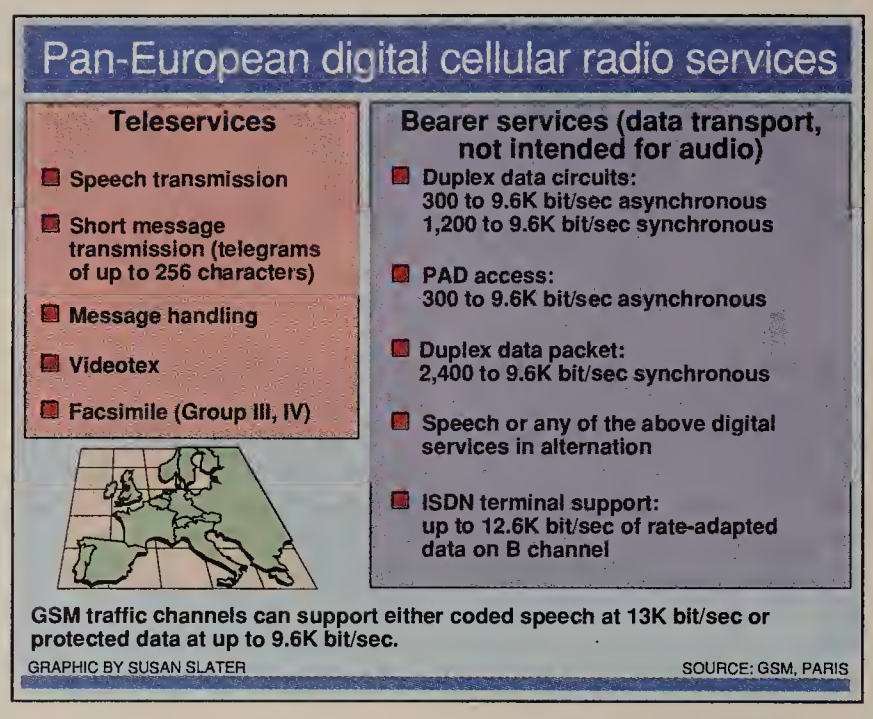
France, for instance, has been digitizing since 1974. With 50% to 60% of its telecommunications capacity digitized, its public switched telephone network (PSTN) is by far the most digitized in the world. Indeed, France is probably the only country in the GSM system that could envisage implementing a nationwide — let alone pan-European — digital cellular radio network at the moment.

At the other end of the scale, Germany, which only began digitizing in 1981, would need up to 10 years to reach the current French level.

The second problem GSM system equipment vendors must face is that of compatibility with existing PSTNs. Most of the GSM members have installed digital switching systems from the main European telecommunications equipment vendors — GEC-Plessey Telecommunications' System X and Ericsson's AXE at British Telecom, Alcatel's E10 and Ericsson's AXE at France Telecom, Alcatel's System 12 and Siemens AG's EWSD at the German Bundespost, for example.

Digital switches can be considered as mainframe computers dedicated to I/O processing; the number of I/Os runs from about 50,000 to more than 100,000, with each I/O corresponding to a subscriber line or to an equivalent subscriber line on a trunk line.

Interfaces between these systems are made compatible at a local level in countries where more than one type of switch is used. Moreover, despite its official acceptance as a world digital transmission norm, CCITT Signaling System 7 is by no means as widespread as might be expected.



Swedish Telecom (known locally as Televerket) will only begin implementation of Signaling System 7 at the end of this year, according to Per-Evert Korlin, network manager for the company. Without standardized signaling, in order for the Mobile Switching Center to be compatible with, for example, an Ericsson AXE transit switch, the center must have an AXE-type switch made by Ericsson.

Formation of consortia

Having assumed that if they supplied the preoperational network, they were most likely to get the contract for the full network, various radio equipment manufacturers formed consortia with switch makers, thus ensuring that at least the preoperational network Mobile Switching Centers would be compatible with existing PSTNs.

The main consortia are headed by the three leading European digital switch manufacturers: Alcatel, Sweden's Ericsson and West Germany's Siemens.

The Alcatel consortium's mainstay is European Cellular Radio at 900 MHz (ECR 900), which is headquartered at Alcatel's main West German subsidiary, Standard Elektrik Lorenz AG (SEL) of Stuttgart, West Germany. ECR 900 comprises France's Alcatel Radio Mobile, formed by the merger of the radio telephone activities of Alcatel and the Paris-based Thomson-CSF group; West Germany's AEG AG, a telecommunications equipment manufacturer based in Frankfurt; and Finland's Nokia, a Helsinki-based telecommunications, electronics and computer equipment vendor.

ECR 900 offered the same range of GSM Base Stations to each carrier to be used in conjunction with any of three different digital switch technologies: Alcatel's E10 and System 12, as well as Nokia's DX200 (used by the Finnish and Turkish PTTs).

Manfred Bohm, chairman of the ECR 900 program at SEL, points out that Alcatel has a major advantage here: Most of the GSM countries, except Sweden and the UK, use at least one of these switch types on their PSTNs.

Ericsson's consortium partners were Orbitel, owned 50/50 by Racal and Plessey Co. plc, and France's Matra S.A., a recently privatized industrial combine.

> "The objective of launching the [GSM] service in 1991 is not contrary to the laws of nature," Pinches says. "The real challenge is to overcome the disagreements that will inevitably arise from time to time. The opportunity for us to prove we can be better Europeans is too important for us to fail."
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Ericsson is already supplying AXE switches to Vodaphone and Cellnet, and the company has a joint subsidiary with Matra in France called Matra Ericsson Telecommunications. Matra's first AXE switch is currently being tested by France Telecom.

Siemens' other partners were Netherlands-based Philips Industries, N.V. (which, incidentally, has a joint marketing subsidiary with AT&T called AT&T and Philips Telecommunications B.V.) and three other West German firms: Robert Bosch GMBH, ANT Telecommunications, Inc. and Telenorma.

As the most urgent need for digital cellular radio is in the UK and, to a lesser extent, in France, it isn't surprising that carriers in those countries were among the first to announce their choice of GSM equipment suppliers.

On July 5, 1988, a spectacular demonstration of state-of-the-art digital cellular technology took place on a boat on the Thames River in London: A digital call was made from the boat to Mallinder at GSM in Paris. After that display, Orbitel said it received an order, worth more than £25 million ($40 million), to supply fully operational digital mobile telephone infrastructure equipment to Vodaphone.

This news was not surprising because Orbitel and Vodaphone share a common parent company, Racal. However, the announcement did represent the first financial commitment by a carrier to use equipment conforming to GSM standards for the pan-European digital cellular radio network. The equipment ordered from Orbitel and its partners Matra and Ericsson will initially serve subscribers in the Greater London and southern England areas.

Vodaphone also ordered a system from Ericsson to cover the Midlands and northern England. Both systems are based on Ericsson's AXE 10 switch technology.

After evaluating competitive bids from Ericsson, Siemens, Orbitel, Philips, GEC-Plessey and Nokia, Vodaphone's competitor, Cellnet, announced on Aug. 2 that it had opted for U.S.-based Motorola, Inc. and its European despost announced contracts for the first phase of its digital cellular radio system. These contracts went to ECR 900, based on Alcatel's System 12 switch; and the Siemens/Philips consortium, based on Siemens' EWSD switch.

Motorola surprise

But perhaps the most surprising and controversial decision the carriers made was the award, by the four Scandinavian PTTs, of a contract for a single, common validation system to Storno. The Scandinavian system will be implemented in Oslo, Norway, with a section in Copenhagen managed by Telecom Denmark.

The Scandinavians' choice is controversial because it effectively excludes their usual switch suppliers — Ericsson, Alcatel, Siemens and Nokia — from the validation phase.

Commenting on this decision, H.W. Clark, Motorola's operations manager for Europe, notes that an important part of his firm's strategy is to produce small exchanges built around the EMX, a digital switch family supporting up to 20,000 subscribers.

Unlike GEC-Plessey's System X, Ericsson's AXE, Siemens' EWSD and Alcatel's E10 and System 12, the Motorola product is not used as a main switch on PSTNs. The EMX, however, has been shipped all over the world and can be delivered right away for use as stand-alone GSM Mobile Switching Centers. Also, economies of scale give Motorola a substantial price advantage.

Moreover, under the current "validation" arrangement, the U.S. firm's GSM system does not need to be compatible with each country's PSTN switches until Signaling System 7 is completely implemented throughout Europe. This arrangemement is aimed at solving the thorny switch-compatibility problem once and for all by allowing new equipment, such as GSM Mobile Switching Centers, to be hooked into any existing digital network without having to add costly interfaces specific to each network.

"Better Europeans"

Orbitel's Pinches, who is understandably one of the more enthusiastic advocates of the pan-European digital cellular radio project, offers these inspiring words to all concerned with the project: "Clearly, the objective of launching the [GSM] service in 1991 is not contrary to the laws of nature.

"It will, however, need continuing optimism, cooperation and goodwill among all involved if the program time scale is to be met," he says. "The real challenge is to overcome the pessimism, disagreements and ill feeling that will inevitably arise from time to time and to keep any resultant delay to weeks or, at most, months. The opportunity for us all to prove we can be better Europeans is too important for us to fail."

BUYER'S GUIDE

MICRO-TO-HOST LINKS

From emulation to cooperative processing

By BRUCE GUPTILL

The microcomputer-to-host computer connectivity market is big, and getting bigger. This is both good news and bad news for users.

The good news: Product and technology developments will make it easier not only to connect a microcomputer with a host but also to let the microcomputer co-process applications with the minicomputer or mainframe in real time.

The bad news: Users may have to restructure their entire data processing/data communications environments to take advantage of the new technologies.

A question of evolution

Users can choose from an array of microcomputer-to-host communications products, from basic terminal emulation and file transfer up through local network gateways and cooperative processing with mainframes.

Even so, the overwhelming majority of the market is still terminal emulation products, with plug-in, personal computer board-based IBM 3270- and 5250-type units leading the pack (see "Comparing emulation products," page 43). The main reasons for this are the established user base for terminal emulation and the relative simplicity of the products, especially at the lower end (see "The basics of terminal emulation," page 40).

Chart Guide

The features and prices of various microcomputer-to-host links are listed in a chart beginning on page 42.

"The bulk of the market is still just a dumb terminal emulator," according to Mike New of Attachmate Corp., a Bellevue, Wash.-based vendor of terminal emulation products. A former software and hardware development engineer, New is now vice-president of marketing for Attachmate.

"Bring up the PC, and it looks like a 3270 screen," New says. "A few packages acknowledge that there's some intelligence in the PC and allow operations like multiple sessions and file transfer."

He notes, however, that it makes little sense for users to spend thousands of dollars on a microcomputer and software to emulate a dumb terminal with limited functionality. "There are products on the market that offer a lot of productivity that people just aren't using," New says.

This is starting to change.

(continued on page 40)

A big market makes it easier than ever for users to tie into the host, but restructuring the environment may be necessary.

Guptill is features writer for Network World.

The basics of terminal emulation

There are three basic types of terminal emulation: coaxial, remote and local network connections. As stated in the accompanying feature, the majority of emulation products are still based on the IBM 3270 coaxial connection between the microcomputer and an IBM 3X74 control unit.

The popularity of the coaxial connection is due to its simplicity and low price compared with remote and local net connections. Users can often "plug and play" by installing a coaxial board in a personal computer and connecting the coaxial cable. Emulation is often basic and depends upon product processing power and software capabilities. Link speed is determined by the coaxial cable, the emulator hardware and software, and the host software.

Two types of coaxial connections are used: Digital Communications Associates, Inc.'s Irma and IBM's 3270 connection. Many vendors offer models with either type; some offer both on one board.

Remote links are more portable and more complicated. A remote product allows the personal computer to appear to the host not only as a coaxial-connected display or printer but also as a remote 3X74 controller. As with the 3X74, remote users can access the host via a dedicated or dial-up line. Dial-up links require a Synchronous Data Link Control adapter; dedicated lines require a Binary Synchronous Communications adapter with an RS-232-C port.

Such products include AST Research, Inc.'s 3270 offerings, Cullinet Software, Inc.'s Information Center Management System and ICOT Network Systems, Inc.'s Communications System. Link speeds are limited by line quality, modem speed and individual emulator capabilities.

Local net connections are receiving the most attention. Although the most complex and expensive method of linking microcomputers and host computers, they have advantages — such as distributed and cooperative processing — that may outweigh these drawbacks.

Most local network configurations use a microcomputer as the local net gateway. The gateway appears to the host as a 3X74 cluster controller with several coaxial devices attached. The gateway may be connected via coaxial cable or as a remote with an SDLC adapter and a synchronous modem.

Each workstation on the local net requires a local net adapter; this may be provided by the network vendor or by the emulation vendor. Terminal emulation is provided by the network software. Top local net vendors, such as Novell, Inc., 3Com Corp. and Ungermann-Bass, Inc., offer both network and emulation products.

Link speed depends on the gateway-to-host link, the bus used in the gateway and the type of network. Distributed local net applications may also affect throughput.

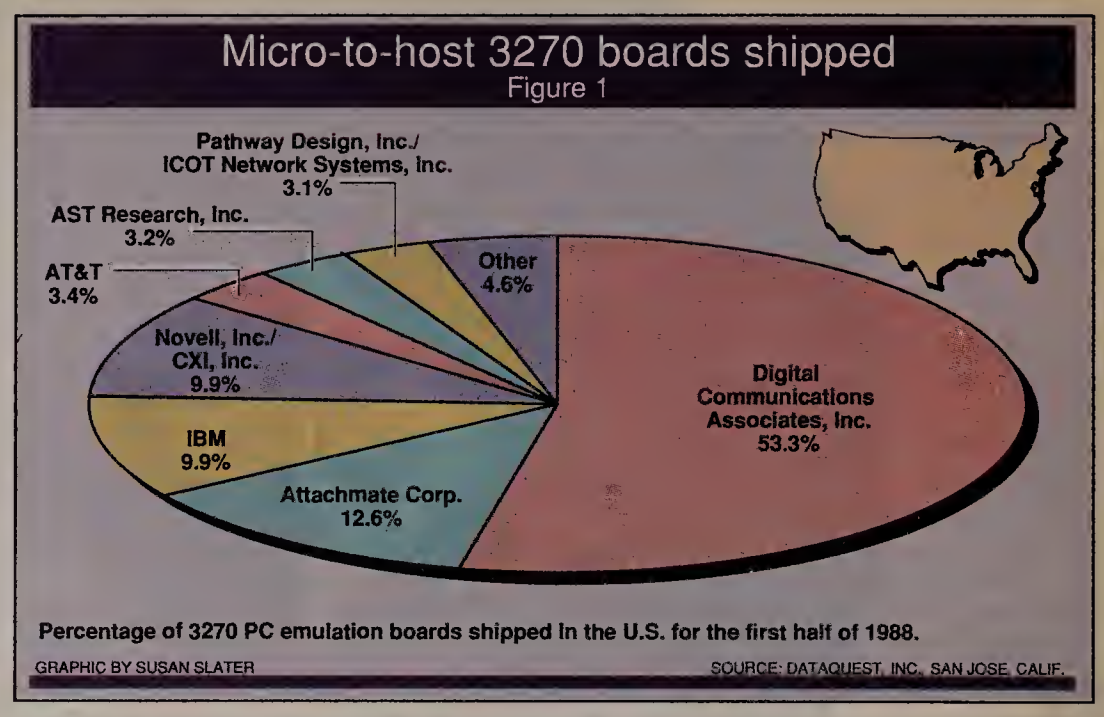
— Bruce Guptill

(continued from page 39)

Doug Lifton, senior product manager for Digital Communications Associates, Inc. (DCA) of Alpharetta, Ga., says he sees "more of a segmentation of the marketplace. When we first came out with the Irma product five years ago, that was the entire market," he says. "It was terminal emulation, and you could get it one way. It was like buying a Model T."

The market is a reflection of the task at hand, says Dave Passmore, a principal with Network Strategies, a consulting practice of Ernst & Whinney in Fairfax, Va.

"It's a [low-end] terminal emulation market primarily because of what you have to communicate with at the host end," Passmore says. "What people really want in terms of access to the mainframe is the ability to run existing mainframe applica-



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What do we call an organization that insists on hard network comparisons and live evaluations before buying?

tions, which were all written for full-screen 3270 displays.

"It's extremely straightforward in terms of communications," he says. "It's just a plain-vanilla SNA LU 2 session, typically with SDLC."

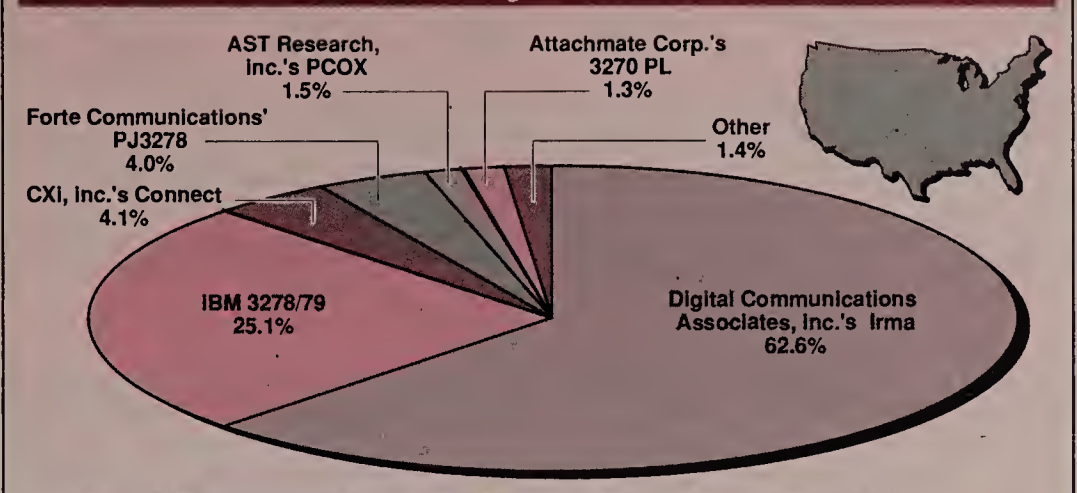
"Quite frankly, a [Control Unit Terminal-mode] coax board is not a lot of work," says Charles Robins, a founder of Rabbit Software Corp., an emulation and communications product vendor located in Malvern, Pa.

The relative ease of manufacturing and packaging terminal emulators has made this a commodity market, with more than 100 vendors offering products at all levels of functionality. Most offer some sort of plug-and-play CUT- or Distributed Function Terminal-mode coaxial board.

Technology and product developments

Micro-to-host 3270 products installed

Figure 2



Figures are based on interviews with 5,400 user companies and show the percentage of 3270 terminal-emulation products installed in the U.S. as of November 1988.

GRAPHIC BY SUSAN SLATER

SOURCE: FOCUS RESEARCH, INC., WEST HARTFORD, CONN.

in the last year, however, are causing many users to seek connectivity flavors other than the "plain vanilla" mentioned by Passmore.

Analysts and vendors alike are noting trends in three areas beyond basic terminal emulation: increased connectivity through local networks; cooperative processing between microcomputers and hosts, especially mainframes; and corporate acceptance of such products as IBM's OS/2 operating system and Apple Computer, Inc.'s Macintosh computer.

Linking local nets

One of today's most talked-about network trends is the connection of microcomputers to hosts via local networks. As more users install local nets in the workplace, more local net-to-host links are being considered.

Jeff Kaplan, an analyst with The Ledgeway Group, Inc., a market research and consulting firm in Lexington, Mass., says his company's research points to local net-to-host connectivity as an opportunity for vendors and consultants alike. "We found that the LAN part is the area where managers need the most help in terms of service and support, and it's an area of great opportunity for the next couple of years," Kaplan says. He suggests that local net vendors such as Novell, Inc. and 3Com Corp. have the inside track in this area.

Network Strategies' Passmore looks for local net-to-host connectivity to increase as a function of data base applications, specifically those using SQL. In fact, he says market acceptance of local net gateways for microcomputer-to-host communications may lead to an evolution in work group computing.

"All these different vendors are developing SQL servers to run on the LAN," he says. "You end up with, essentially, a two-step process. You have the front end on the individual PC workstations, and those might be DOS PCs rather than OS/2 PCs. They then talk to the SQL server."

While the basic local net-to-local net gateway market has been thriving for a few years, users have been slow to adopt the technology for communicating with host computers. Leslie Lord, senior microcomputer communications analyst with International Data Corp. (IDC) in Framingham, Mass., says that gateways as microcomputer-to-host links may have gotten a bum rap.

"The gateway has been around for years now, but it never got off to its full potential," she explains, "because it's always been plagued by [complaints like], 'It's hard to troubleshoot,' 'Gateways are hard to install' or 'It's hard to keep them up and running.' "

Advances in the technology and better educated users are starting to overcome these arguments, she adds.

Lord looks for increased user interest in gateways, including OS/2-based gateways, as host links for this year. "I expect that there will be a lot of evaluation of OS/2-based LAN gateways for SNA, for using a LAN to get into an SNA environment for PC-to-mainframe communications," she says. She cautions, however, that the interest may not translate into actual dollars spent on products.

"Users may not buy OS/2-based gateway solutions," she says. "[The solutions] require a very large PC-based platform with lots of memory and OS/2 Extended Edition. At least, that's IBM's solution. There will also be a lot of third-party alternatives in this 1989 round of evaluation."

(continued on page 43)

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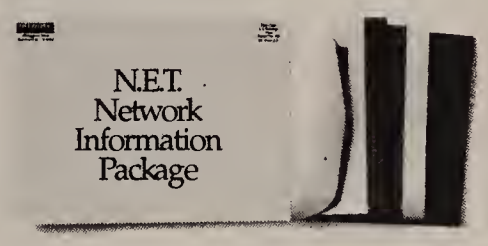

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Microcomputer-to-host links

Vendor	Product	Type	Emulation provided	Hosts//OS supported	Host protocols supported	Host hardware//software required	PC hardware//software required	Transmission modes and speeds (bit/sec)	PC RAM required (bytes)	Security	Pricing//warranty
AST Research, Inc. Irvine, Calif.	AST 3270 family	PC board, software	3270 Type II and III coaxial and SNA remote	IBM System/370-class hosts	SNA/SDLC coaxial	Coaxial operates with IBM, Irma and AST emulation; SNA supports AST emulation			58K with single session; 275K with 3 sessions	Emulator and configurator security	$895 plus options//2 years
AT&T Morristown, N.J.	6386 WGS SNA/3270	Software	3274-51C, 3278, 3279, 3287	IBM mainframes// VM, DOS/VSE, MVS	SNA/SDLC	Front-end processor, synchronous modem//VTAM	GPSC-AT//AT&T SNA/Link	19.2K	4M		$1,800
Attachmate Corp. Bellevue, Wash.	EXTRA! Connectivity Software	Software	3278, 3279 displays, Models 2, 3, 4, 5; 3278 printer	All IBM mainframe software	SNA/SDLC, BSC	NA	3270 coaxial adapter, SDLC adapter or NETBIOS-compatible LAN adapter//DOS 2.1 or later (3.0 for LAN)	Up to 16M on token-ring LAN	100K	Supports all mainframe security packages	$425//90 days
Cleo Software Rockford, Ill.	3270 SNA	PC board, software, hardware	IBM 3270 SNA	3270 SNA	3270 SNA	None	MS-DOS, PC-DOS; NETBIOS-compatible LAN interface	2,400, 4.8K, 9.6K, 19.2K	PC LAN gateway 180K; workstation 170K; internal modem 250K	NA	$795 (card and software) to $1,995 (LAN gateway)//6 months
Communications Research Group Baton Rouge, La.	BLAST Communi-cations Software	Software	VT-100, VT-220, D200, TTY, IBM 3101	DEC VAX, PDP-11; IBM mainframes; Wang VS, Prime, DG, HP//VMS, DG MV, HP MPE and RTE, Harris VOS, MS-DOS, Unix, Xenix	XModem, TTY, ASCII, BLAST	RS-232-C asynchronous or virtual asynchronous circuits; net interface for LANs	RS-232-C port; MS-DOS or Xenix	1,200, 2,400, 4.8K, 9.6K, 19.2K modems or 38.4K direct-connect circuit	256K minimum; 512K recom-mended		$195 to $1,295, depending on hardware and operating system
Comterm, Inc. Pointe-Claire, Quebec	6192-PC	PC board	3192 C/D or F; 3270 display terminal	Any IBM	SNA/SDLC; SNA/X.25; BSC	Any IBM	MS-DOS 3.0 or later	Full Coaxial A speed	256K		$795//90 days
Control Data Corp. Greenbelt, Md.	VistaCom	Software	VT-13, Tektronix 4105, Televideo 925/950, DG 200, Tab E-32, ADM 3, IBM 3278, TTY, CDC Cyber 721	IBM mainframes, Unix hosts, DEC VAX, CDC Cyber and compatibles// VMX/Ultrix; IBM CMS/TSO; DG APS; Honeywell, Inc. GCOS8; Prime MOS; Harris VOS; CDC Cyber NOS, NOS/VE	Asynch-ronous, XModem, Kermit	CDC Vista	RS-232-C port or Hayes-compatible modem	300 to 38.4K	512K	NA	$200 for 1 to 25 copies; $100 for 26 or more copies//media for 90 days, 30-day return policy
Cullinet Software, Inc. Westwood, Mass.	Information Center Management System	Software	TTY, VT-100, VT-52	IBM 370, 30XX, 43XX, 9370// OS/VS1, OS/VS2, MVS, MVS/XA, VM/CMS, DOS/SP, DOS/VS, DOS/VSE	SDLC, DCA Irma remote BSC					Supports host-based RACF, ACF2, Top Secret	$26,000 to $75,000
Datability Software Systems, Inc. New York	RAF Remote Access Facility	Software	VT-100, VT-220	DEC VAX//VMS	RAF proprietary; LAT-compatible	Ethernet controller on VAX (if run on Ethernet)	Ethernet card (if run on Ethernet)	Asynchronous/ 300 to 38.4K; Ethernet 7M	70K asynch-ronous; 90K to 120K Ethernet		$395 per PC and $395 per host; host master license available//90 days
Digital Communications Associates, Inc. Alpharetta, Ga.	Irma 2	Software, hardware	3191, 3278, 3279	Any IBM mainframe	3270, LU 2.0	IBM 3270 mainframe graphics	2 floppy drives		80K minimum, 128K maximum	NA	$1,195//9 months software, 12 months hardware
Digital Equipment Corp. Merrimack, N.H.	VAX/VMS Services for MS-DOS	Software	VT-220	DEC VAX//VMS	DECnet	VMS Services running on VAX	Ethernet controller (DEC, 3Com Corp., Micom-Interlan, Inc.)	300 to 1,200; DECmation			$500; quantity discounts available
Eicon Technologies, Inc. Montreal	ACCESS/ QLLC	PC board, software	3278 Models 1, 2, 3, 4, 5; 3279 Models S2A, S3B, S3G; 5251, 5291, 5292, VT-100, TTY, ASCII	IBM/SNA, System/3X, AS/400; DEC; HP; Tandem and others//DOS	X.25	X.25, NPSI, DSP		64K	256K	Password	$1,595 to $4,695//hardware 1 year, software 90 days
Emulex Corp. Costa Mesa, Calif.	DCP-286i	PC board	User program-mable	User programmable	Asynch-ronous, BSC, HDLC, SDLC	NA	Any	Up to 150K	256K	NA	$1,395 to $1,695//2 years
IBM Research Triangle Park, N.C.	3278 Emulation Adapter/3270 Connection	PC board	3270	IBM System 370/ software-dependent		IND$FILE	NA	2.3587MHz	Software-dependent	NA	$623 hardware only//1 year
ICOT Network Systems, Inc. Natick, Mass.	ICOT Communi-cations System	PC board, software	2780/3780, 3278, 3279 Models 2, 3, 4, 5; 3770, 5250	IBM 30XX/43XX, System/3X, AS/400, 8100//IBM SSP, CMS, DOS, OS/400, VM, OS/VS, IMS, CICS, MVS, TSO	NSA/SDLC, BSC, RJE, X.25	NA	Provided with product	9.6K to 56K remote; 2.35M to controller	65K minimum, 256K maximum	Optional encryption	$595 to $6,595//1 year, hardware and software
IDEAssociates, Inc. Billerica, Mass.	IDEAcomm 5251	PC board, software	3180, 3196, 4214, 5224, 5225, 5256, 5251-11, 5291, 5292-2	IBM System/3X, AS/400	Twinaxial, SNA/SDLC	NA			128K	NA	$795//1 year
Information Technologies, Inc. Scottsdale, Ariz.	LinkUp 3270 Coax GateStation	PC board, software, hardware (includes 122-key keyboard)	3278, 3279 Models 2, 3, 4, 5; 3286, 3287	Any IBM	SNA, non-SNA, BSC	IBM mainframe or compatible and controller with 3299 support	NA	Controller-dependent	150K for gateway; 70K for remote nodes	NA	$2,295 (includes remote node software)/1 year

ACF2 = Computer Associates, Inc.'s Access Control Facility 2
BLAST = Blocked Asynchronous Transmission
BSC = Binary Synchronous Communications
CDC = Control Data Corp.
DCA = Digital Communications Associates, Inc.
DEC = Digital Equipment Corp.
DG = Data General Corp.
DSP = Display Systems Protocol
GPSC-AT = General Purpose Synchronous Controller-AT
Harris = Harris Corp.
Hayes = Hayes Microcomputer Products, Inc.
HDLC = High-Level Data Link Control
HP = Hewlett-Packard Co.
LAT = Local Area Transport
NA = Not applicable
NETBIOS = Network Basic I/O System
NPSI = NCP Packet-Switching Interface
NSA = National Security Agency
Prime = Prime Computer, Inc.
RACF = IBM's Remote Access Facility
RJE = Remote job entry
SDLC = Synchronous Data Link Control
SNA = Systems Network Architecture
Tandem = Tandem Computer, Inc.
Tektronix = Tektronix, Inc.
Televideo = Televideo Systems, Inc.
Top Secret = Security software from Computer Associates
Wang = Wang Laboratories, Inc.

(continued on page 48)

Comparing emulation products

Reflecting market reality, the accompanying comparison charts are limited to terminal emulation products, both software and plug-in boards. The charts also reflect the dominance of IBM and compatibles in the host and microcomputer markets. At the host level, almost all the listed vendors offer hardware and software that support IBM mainframes and minicomputers as well as their operating systems.

Most also offer products that support processors from Amdahl Corp., Control Data Corp., DEC, NCR Corp., Unisys Corp. and other major computer vendors. Not unexpectedly, IBM's Systems Network Architecture/Synchronous Data Link Control is the host protocol most often supported.

Microcomputer support is based on IBM industry standards, with at least 512K bytes of random-access memory. Almost all the vendors listed support both DOS-based and OS/2 machines.

The personal computer RAM required averaged less than 256K bytes, which would allow use of most listed emulation products with older IBM Personal Computer-, XT- and AT-style machines that have limited memory.

Security

Few terminal emulation vendors provide any level of security as standard equipment for their products. Many don't even offer it as an option; and those that do primarily offer password-limited access. The reason most often given for this is that vendors consider security to be a host function.

Stan King, executive vice-president of Mackensen Corp., sums up the viewpoint of most vendors by saying that, since the information to be accessed is on the host, that's where the security should be.

"If the mainframe already provides some level of security, there's no need to carry that over and put an additional layer of security on the PC products," King says.

"We believe that the primary purpose of a gateway product or a 3270 product is to access the mainframe," he continues. "If a person can log on to a dumb terminal and have access to those files anyway, why should we put a password or other security system into the emulation product? It's just another thing that could go wrong." Mackensen does, however, offer password-level security to OEMs and direct customers as an option.

Warranties and pricing

Warranties range from 30 days to two years. Users should carefully check warranty coverage because some vendors offer different terms for the software and hardware portions of the same product.

Prices for the products were provided by the vendors. Most offer quantity discounts, either directly from the vendor or through a distributor.

— Bruce Guptill

(continued from page 41)

An outgrowth of the burgeoning local net market is increased user interest in cooperative and distributed processing. This market niche depends on user acceptance of IBM's Advanced Program-to-Program Communications and LU 6.2, as well as Application Program Interfaces (API) such as IBM's Enhanced Connectivity Facilities/Server-Requester Programming Interface (ECF/SRPI).

A step toward cooperative processing between microcomputers and mainframes, ECF/SRPI requires a pair of applications: one in the host (server), the other in the microcomputer (requester).

APPC has been around for years, but user implementation has been slow due to the lack of products using IBM's LU 6.2 protocol. The lag can be explained by the large established base of 3270 terminals (and terminal emulation products), which use LU 2 protocols. APPC requires considerable changes in existing 3270-based networks, including application programs built from the ground up and network support for LU 6.2.

APPC products for mainframes are common; the implementation drought has been mainly in APPC products for microcomputers.

APPC and LU 6.2 should have a good future, says Claire Fleig, director of systems research at International Technology Group in Los Altos, Calif. Support for LU 6.2 within IBM's ECF will be an important step, she adds. It defines more of a clear interface between what goes on in the workstation and what goes on in the mainframe as part of cooperative processing.

"Right now, [ECF is] only supporting LU 2 — the 3270 environment — but it is scheduled to also support LU 6.2," she explains. "I anticipate that we will see something on that by June 1989. The capabilities to use the protocol are supported on almost all IBM hardware systems and key operating systems under the Systems Application Architecture environment."

Network Strategies' Passmore says that products under the SAA umbrella may help provide more seamless connectivity in cooperative processing applications. "There's ECF/SRPI, the LU 6.2 verbs and the new interface that IBM is promoting, Common Programming Interface for Communications (CPIC)," he says. "CPIC essentially takes elements of the LU 6.2 verbs and ECF/SRPI and provides a single

(continued on page 48)

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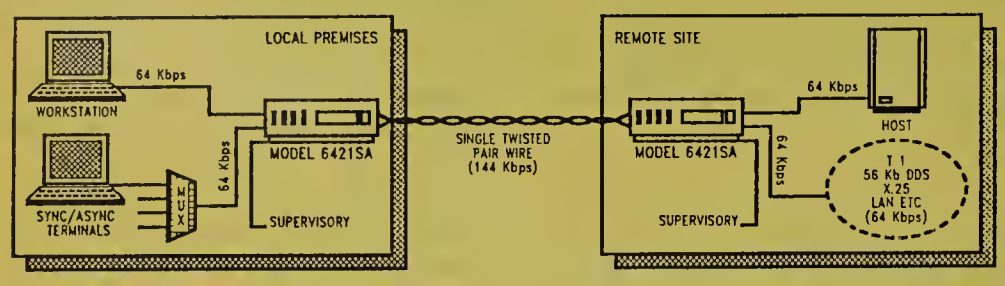

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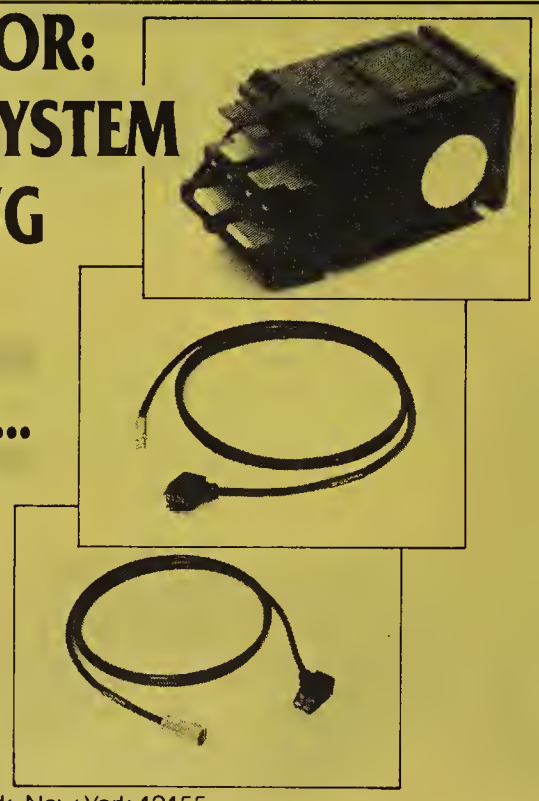

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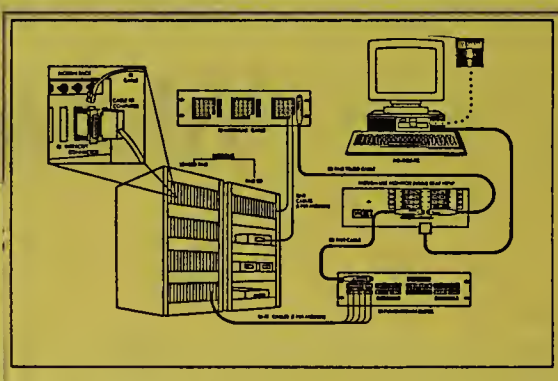

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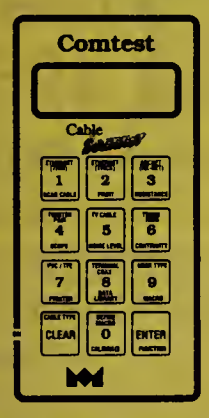

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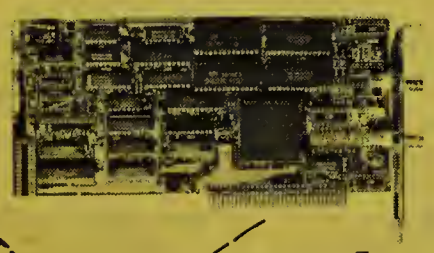

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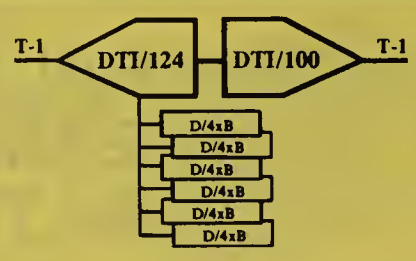

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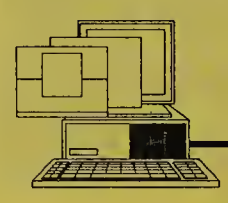

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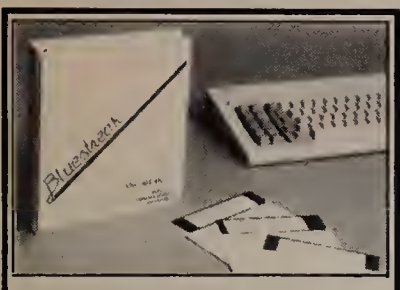

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Microcomputer-to-host links (continued from page 42)

Vendor	Product	Type	Emulation provided	Hosts//OS supported	Host protocols supported	Host hardware// software required	PC hardware// software required	Transmission modes and speeds (bit/sec)	PC RAM required (bytes)	Security	Pricing/warranty
Mackensen Corp. Santa Monica, Calif.	File Transfer System	Software	Any 3270 emulation products, including coaxial, remote, gateway and protocol conversion products	IBM System/370, 30XX, 43XX, Enterprise System/ 9370// MVS/370, MVS/SP, MVS/XA, VM/SP, VM/IS, VM/XA, DOS/VS, DOS/VSE, DOS/ VSE/SP, TSO, CMS, CICS, IMS, IDMS, FTS/VTAM, FTS/SR	3270 data stream, SNA and non-SNA, 3270 A coaxial, RS-232-C, Token-Ring		Any 3270 emulation product	Any 3270-supported mode and speed	100K	Host-dependent	$10,000 per mainframe CPU license with unlimited PC workstation licenses; OEM pricing available//1-year maintenance
McCormack & Dodge Corp. Natick, Mass.	PC Link 3.0	Software		IBM 30XX	SNA	PC Link// Millenium	Emulation hardware and software (supports DCA, IBM, Novell, Inc. and compatibles)	NA	256K	Host-dependent	$35,000 per mainframe CPU; $1,100 per PC
Micro Tempus, inc. Montreal	Tempus-Share	Software (virtual disk)	3101, 3270, asynchronous dial-up	IBM mainframes and compatibles// MVS/VTAM, TSO	VTAM LU 0, LU 2.0 (Half-duplex flip-flop mode)	IBM or compatible mainframe, DASD, front-end processor, local and remote terminal control units	IBM PC or compatible//PC-DOS, MS-DOS or later; Microsoft Corp.'s MS-Net	Asynchronous, BSC, 3101, SNA/SDLC, X.25//300 to 19.2K	256K	Optional interfaces to RACF, ACF2, Top Secret	$22,300 to $34,500; $2,300 to $4,100 for security options//1-year maintenance
Multi-Tech Systems, inc. Mounds View, Minn.	MultiCom 3270	PC board, software	3278 Model 2, 3, and 3279 Model 2 for PC AT; 3278, 3279 Models 2, 3, 4, 5 for Personal System/2	IBM mainframes and compatibles// VM/CMS, MVS/TSO, DOS/VSE	CMS, VSE/TSO	$FILE for file transfer	IBM PC, XT, AT, Personal System/2//MS-DOS, PC-DOS, OS/2	NA	128K	Keyboard and screen combination lock	$599 for hardware only; $649 to $699 with software//2 years, parts and labor (factory repair)
Novell, Inc. Sunnyvale, Calif.	NetWare SNA Gateway	PC board, software	3270	Any IBM SNA and compatible hosts	SPX and NETBIOS	IND$FILE	Novell NetWare 3270 LAN workstation software	Up to 56K for remote connections			$2,995
Quadram Corp. Norcross, Ga.	Main Link II	PC board, software	3278	IBM mainframes and compatibles//TSO, CICS, VM	SNA, IND$FILE	IND$FILE	Main Link II//Main Link IIE, Main Link DFT, Main Link DFTLW5	2.35M	30K	Password	$345 to $595//1 year
Rabbit Software Corp. Malvern, Pa.	RabbitGate	PC board, software	3270 Models 2,3,4,5; DSC, SCS printers (LU 1 and LU 3)	IBM mainframes and compatibles//TSO, CICS, CMS	SNA, BSC, DFT	NA	DOS 3.1 or later	SNA up to 64K, BSC up to 19.2K	120K minimum	Dedicated or pooled logical units	$1,695 to $7,995//1 year
Relay Communications, inc. Danbury, Conn.	Relay Gold	Software	3101, 3270; VT-100, VT-220, VT-240, VT-52, TTY	IBM 30XX, 43XX// VM/CMS, VM/VTAM, MVS/TSO, MVS/VTAM	Relay Protocol, Kermit, XModem CRC, XModem Checksum	Relay/VM, Relay/TSO, Relay/3270 software	Modem or direct connect	Asynch-ronous// 300 to 38.4K	19.2K	Data encryption, password	$295 for Relay Gold; $6,500 to $14,500 for mainframe software

(continued from page 43)

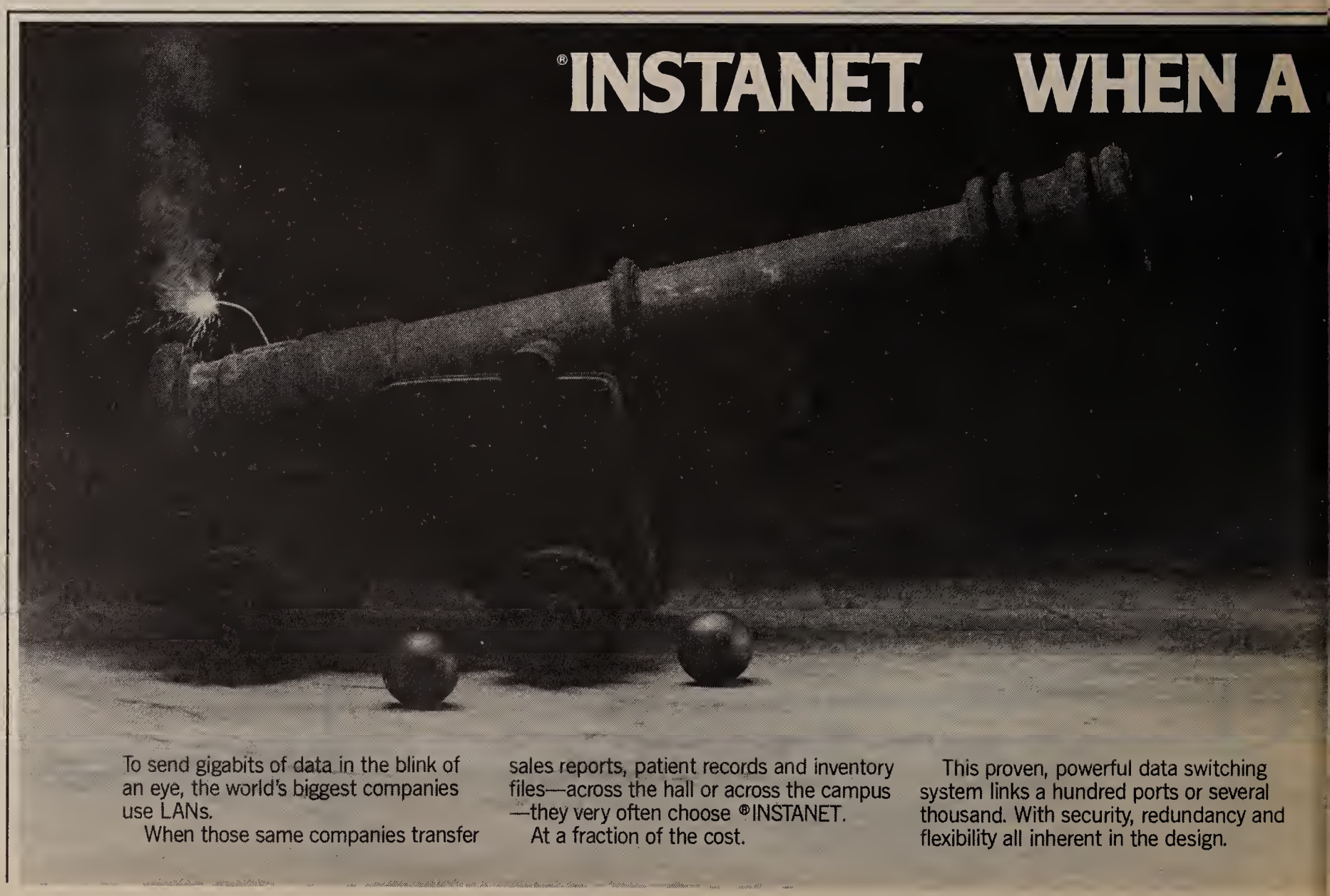
new application program interface that developers can use for cooperative processing.

"That should help things quite a bit [in applications development]," Passmore adds. "It clears up a little bit of the confusion about whether people should be using [High-Level Language API], LU 6.2 verbs directly or ECF/SRPI."

Delay in user acceptance can be blamed on a lack of applications. "There has been a lot of interest in LU 6.2 and what it's going to do, but application development in the SNA environment is especially difficult," Fleig explains.

Passmore says he believes that cooperative processing will change some of the basic assumptions in corporate data processing and communications.

"I think you're going to see, through cooperative processing, the mainframe become little more than a data base server to the PCs, which will use their intelligence as a front-end [processor]," Passmore says. He adds that users will likely see a combination of cooperative and distributed processing — an evolution of today's departmental comput-



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Microcomputer-to-host links (continued)

Vendor	Product	Type	Emulation provided	Hosts//OS supported	Host protocols supported	Host hardware//software required	PC hardware//software required	Transmission modes and speeds (bit/sec)	PC RAM required (bytes)	Security	Pricing/warranty
Simware, Inc. Ottawa, Ontario	SIMPC	Software	3278 Model 2, VT-100, TTY	IBM mainframes and compatibles// MVS/VTAM, VM/GCS, VM/SP	Proprietary	NA		Asynchronous, synchronous, BSC, LAN//300 to 19.2K	320K	Password	$325 for single copy (right-to-copy licenses available)//1 year with right-to-copy license; 90 days with single copies
Sterling Software, Inc. Rancho Cordova, Calif.	PC TRACS	PC board, software	2780, 3770, 3780	IBM mainframes and compatibles//MVS, VSE, VM	BSC, SDLC	JES, RSC5, Power//RJE, BTAM	Modem or modem eliminator, RS-232-C cable	BSC, SDLC//2,400 to 9.6K	64K minimum, 192K maximum	BSC ID verification and SDLC logon validation	$185 to $2,460//90 days
Tangram Systems Corp. Cary, N.C.	Arbiter	Software	3270 terminal and 3287 printer, virtual disk	IBM mainframes and compatibles//MVS, MVS/XA, VM	LU 1 (asynch-ronous), LU 2, LU 6.2, X.25	IBM PC AT, XT, Personal System/2//MS-DOS, PC-DOS, OS/2	LAN gateway, SDLC board, coaxial board, modem or other communications interface	Connection-dependent	40K minimum, 120K maximum	Host-dependent	$20,000 to $60,000//30-day trial for product evaluation
Techland/Bluelynx Newmarket, N.H.	BLUELYNX 5251-11 Gateway	Software, hardware (local 5250 adapter)	5250	IBM System/36, System/38, AS/400	NA		NETBIOS-compatible LAN interface; one disk drive	1M	151K	Keyboard lock	$1,995//1 year on communications card; lifetime on software
Ungermann-Bass, Inc. Santa Clara, Calif.	Access/One	Software, hardware	IBM 3270; asynch-ronous	IBM mainframes// MVS, VM, DOS/VSE	SNA, DECnet, XNS, TCP/IP	NA	RS-232-C interface	10M	640K	Password	$25,000//90 days
Unisys Corp. Blue Bell, Pa.	Online Extract/DMS	Software		Unisys 1100/2200// Series/OS1100	Uniscope and UDLC	QLP and DMS or PCI/O	Unisys IS/PC software or STEP	Up to 19.2K	512K with STEP, 640K with IS/PC	Regular 1100/2200 access and file security	$9,959 for complete site license
Universal Data Systems, Inc. Huntsville, Ala.	Sync-Up 208A/B	PC board	SNA 3270, SNA 3770, SNA 5251	IBM 30XX, 43XX, System/38, AS/400//IBM VM, MVS, CICS	SNA/SDLC, BSC	IBM FEP with Bell 208-compatible modem	NA	Asynchronous, synchronous// 4.8K	256K	Optional	$1,140//1 year
Walker, Richer & Quinn, Inc. Seattle	Reflection 4	Software, hardware	VT-220, VT-240, VT-241, VT-340 ReGIS Graphics	DEC VAX//VMS, Unix/Ultrix	XModem, Kermit, proprietary VMS and Unix	Proprietary file transfer (no charge)	Serial or Ethernet card (3Com Corp., Novell, Ungermann-Bass, Inc. and other networks)	Asynchronous and networks//110 to 38.4K (asynchronous)	220K minimum, default 362K	Password and encryption	$299 to $349//90 days material and workmanship
Wang Laboratories, Inc. Lowell, Mass.	Wang 3278/79 Emulation	PC board, software, hardware	3278 Models 2, 3, 4, 5; 3279 Models 2, 3	IBM mainframes// MVS, VM, DOS/VSE	SDLC, IND$FILE, X.25	NA	Wang PC 200/300	Cluster controller-dependent	12K	Host-dependent	$1,195//Wang standard warranty

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BSC = Binary Synchronous Communications
BTAM = Basic Terminal Access Method
DASD = Direct access storage device
DCA = Digital Communications Associates, Inc.
DEC = Digital Equipment Corp.
DSC = Data Stream Compatible
FEP = Front-end processor
JES = Job entry system
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NETBIOS = Network Basic I/O System
RACF = IBM's Remote Access Facility
RJE = Remote job entry
SCS = SNA Character Stream
SDLC = Synchronous Data Link Control
SNA = Systems Network Architecture
SPX = Simplex
STEP = Synchronous Terminal Emulation Package
TCP/IP = Transmission Control Protocol/Internet Protocol
Top Secret = Security software from Computer Associates
UDLC = Universal Data Link Control
Uniscope = Unisys Corp. protocol
XNS = Xerox Network Systems

This chart includes a representative selection of vendors in the micro-to-host link market. Most vendors produce other links, and many vendors not included manufacture a full range of competitive products.

NETWORK WORLD CHART

ing strategies.

"There's a lot of speculation that the departmental system model that exists today — for example, with dumb VT100 terminals talking to a [Digital Equipment Corp.] VAX — will more or less go away," he says. "Essentially, the PC-based LAN server will take the place of the departmental system."

Passmore suggests a three-tiered processing system, with microcomputers at the bottom linked on a local net with a server in the middle tier and mainframes at the top — all processing the same applications.

Robins of Rabbit Software says users are directing the market toward cooperative processing. "People want the responsiveness of the PC combined with the safety and massive data on the mainframe," he says. "The best examples of this are the various virtual disk products, where the 'disk' on the PC is really on the mainframe."

Others echo Passmore's vision of a future three-tiered configuration of data processing, beginning with the mainframe as a central file repository and data base server.

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"It's no longer an issue of defining mainframe, mini and micro in terms of size, shape, smell or cost," Robins asserts. "It's what the equipment is used for: The mainframe is the repository; it does the batch functions, the security, the control and so on. The second tier is the server tier, and the third is the micro."

The difficulty will be providing seamless connections between all three tiers. IBM's APPC, LU 6.2 and more peer-to-peer APIs will be needed to make this a reality. The major microcomputer-to-host vendors, and several smaller ones, are developing products to provide such a capability.

Robins is one of the many vendors waiting for LU 6.2 to take off. "I wish the world would jump all over it," he says, "but realistically, we don't see it becoming a major market until late '89."

In fact, it may be longer than that, says Stan King, executive vice-president of Mackensen Corp., a microcomputer-to-host software vendor in Santa Monica, Calif.

"We have an LU 6.2 project that we started about six months ago, and we finally put it on the shelf because the demand wasn't there," he says. "There was a whole lot of interest but no demand — and there's a big difference there. Nobody's really willing to put their money on the table and say, 'We're willing to start doing this.' "

IDC's Lord believes that more powerful desktop computers may pull LU 6.2 into the market.

"Given that we see corporations installing bigger PC-based platforms — [Personal System/2] Model 50s with lots of memory and disk space — that opens up a lot of opportunities for LU 6.2 applications at the PC level," she says. "I think that there may also be a movement toward more LU 6.2 applications being written by the MIS community for use on PCs, as well as commercial third-party applications."

Macs, VAX and other facts

The Apple Macintosh, long a stepchild of the business computing environment, has begun to come into its own. Advances in processing capability — including a DOS coprocessor for the Macintosh II — along with greater support by software vendors, has opened the corporate doors for the user-friendly Macintosh.

This success is mirrored in the microcomputer-to-host market. Several vendors, including DCA, have announced Macintosh-to-mainframe and Macintosh-to-VAX links. Apple itself is getting into the business, having recently acquired Orion Network Systems, Inc., a manufacturer of microcomputer-to-host products.

One analyst who requested anonymity says Apple acquired Orion only to develop microcomputer-to-mainframe products.

"Mac-to-mainframe connectivity is still a very small piece of the market," Lord says. "[But] vendors like Avatar [Technologies, Inc.] and DCA have broken some ground there, and they've got a lot of people asking for their products.

"The Macintosh is a nice platform [to use] to get access to your mainframe applications," she adds. "You can use Apple's MacWorkstation tool kit to make things look really user-friendly.

"I think, in 1989, we'll see a lot out of Apple's acquisition of Orion in the form of PC-to-mainframe," she predicts.

Fleig of International Technology Group concurs with Lord, and she adds that the acquisition may be cutting a major developer out of the third-party market.

"You're dealing with a specialty environment, with a smaller number of players, and two of the key players have been bought out: Orion and Communications Solutions [Inc., bought by 3Com]," she explains.

"With Orion, the emphasis is going to be on Apple products, not on generally available third-party products, and that cuts out a key player in terms of application development." She adds that the same thing hasn't happened to Communications Solutions yet, but "there is the potential for them to become more of a development arm for 3Com than a third-party developer."

Network Strategies' Passmore ranks the Macintosh as one of the important factors in future microcomputer-to-host communications. "You're really talking about four workstations in the future: DOS, OS/2, Unix and Mac," he says. "Any third-party application developer these days is saying, 'How can we write our code in C and then how do we port it to

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OS/2, where are you?

The consensus in the marketplace is that OS/2 "ain't here yet," as one vendor put it, but it will be important simply because IBM is behind it. Most industry observers and vendors agree that it will be late in 1989 before any real effect is seen in this market. In fact, vendors seem more skeptical of OS/2's impact than most analysts.

"So far, it's a matter of acceptance by users," Attachmate's New says. "Not many people are using OS/2. The applications just aren't there yet."

"The impetus for OS/2 products has not come from the user base," says DCA's Lifton. "Up to this point, it's been driven by Microsoft [Corp.] and IBM. There is no market for OS/2 products today. I think we'll start to see the impact of OS/2 within the next year."

Mark Proudfoot, vice-president of Techland/Bluelynx, a terminal emulation vendor in Newmarket, N.H., agrees. "OS/2 won't have any immediate effect on the market," he says. "It may in the long run, if it takes off. It really is an interesting 'if.' "

Passmore says he believes that OS/2 acceptance will help define the middle level of the future three-tiered computing model. "I think there's general agreement that the first real use of OS/2 will be in servers," he says. "Since people can't afford all the memory and processing capability [required by OS/2] for individual desktops, you put it all on the server and have the ability to run applications on the server."

People are also talking about doing more in a local network environment and distributing the processing between an OS/2-based server and either OS/2 or DOS workstations, he adds.

But what about other operating systems, especially Unix?

"The market can choose one of two ways to go: Unix or OS/2," Passmore says. "There's no question that the OS/2-Unix battle is shaping up to be a major confrontation. Third-party developers are really having trouble figuring where to place their bets."

A dyed-in-the-wool Unix fan, Robins says he feels that both Unix and OS/2 have a role to play in future microcomputer-to-host communications products. "Unix has the multitasking capability of OS/2," he says. "It also has something that OS/2 doesn't have: multiuser capability. You can use it as a poor man's LAN."

Will the market continue to be dominated by two or three vendors? Attachmate's New offers his opinion:

"I think there may be some consolidation. But for every company that gets swallowed up by a larger one, another one or two starts up," he says. "There's always going to be two or three people at the top. But if you're a small company with five people and a hot product, 1% of the market is a real good living."

As the technology advances, will more functionality and power — including operating systems — appear in the products?

"I think you will see more vendors supplying intelligent base cards in which they can run at least some portion of their code on the card, so we don't [use] as much memory in the machine itself," DCA's Lifton says.

"I think we'll see the equivalent of [IBM's] VM operating system on a chip in the next several years," Robins says. "Ultimately, you will be able to pick your operating system and run Unix or OS/2 or DOS in multiple windows."

More good and bad news

The advances in technology may leave users facing the same good news/bad news situation. The good news is that you will be able to do almost anything you want between microcomputers and hosts, and do it seamlessly. The bad news is that some changes will have to be made.

"What the users are faced with at this point is going almost back to a clean slate in the design of their information systems," Passmore says. "The [idea of] centralized processing on the host and dumb terminals in the field, which has been around for 20 years, needs to be rethought. Cooperative processing is a fundamental new way of restructuring the entire information system.

"It's a logical evolution," he says. "People are realizing the capabilities of their desktop computers and saying, 'Hey, there's some pretty neat stuff we can do here. Imagine what more we could do if we could link this to our mainframes and break up some of the processing.' "

Vendors are facing the same sort of choice: Evolve with the market or lose.

"We are not in a product market anymore; we are in a solutions market," Robins says. "You've got the mainframe, the micro, the LANs, the minis, gateways, all this stuff. It's all got to work for any of it to work. The general trend to systems integration reflects this. The successful companies will dovetail into this trend."

HP pegs LAN Mgr./X as industry standard

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Because of the joint development agreement with Microsoft, users can expect to see the following OS/2 LAN Manager features in HP LAN Manager/X:

- Remote file, printer and plotter sharing.
- Support for Advanced Program-to-Program Communications mechanisms, including Named Pipes and Mail Slot.
- Standard OS/2 LAN Manager network administration tools.
- Support for a set of OS/2 LAN Manager application program interfaces.
- Support for a range of IEEE 802.3 cabling schemes such as thin- and thick-wire coaxial cabling.
- Ability to work with all Network Basic I/O System- and NETBIOS Extended User Interface-compatible MS-Net-based applications.
- Ability to run on Intel Corp. 80286- and 80386-based machines.
- TCP/IP transport support.
- An intelligent print spooler that can provide detailed information about the file length of a job and the estimated time it will take to complete as well as priority assignment for jobs.

Target markets

Initially, HP LAN Manager/X will be targeted at the installed base of TCP/IP and IEEE 802.3 Ethernets, Bonner said. Extensions to support OSI will be written as the market migrates to that emerging standard, he added.

"All the user demand and need right now is for TCP/IP-based network protocols," Bonner said.

"In addition, TCP/IP provides us and our users with a natural migration path to OSI. But right now, there's not a lot of demand for OSI protocols because [OSI] has a very limited installed base and products are just beginning to be delivered."

HP vs. AT&T

HP's LAN Manager/X will be based on the University of California at Berkeley's Unix Version 5.3 implementation, while AT&T's implementation of LAN Manager will be based on its Unix System V. Beyond that, users may have a difficult time distinguishing between the two products.

"The feature differences between our product and AT&T's Unix LAN Manager will come down to the intrinsic differences between Berkeley's version of Unix and AT&T's Unix System V," said Duncan Campbell, HP's marketing manager for the Colorado Networks Division. "And most of those differences won't mean all that much to the end user."

At this point, since neither product is shipping, no one can say what, if any, interoperability snags users might encounter between the AT&T and HP offerings.

HP's Campbell said, though, that his company wants LAN Manager/X to be interoperable with AT&T's as yet unnamed Unix implementation of LAN Manager. HP LAN Manager/X will be shipped to beta-test sites this summer, with volume shipments expected by the end of the year. Pricing has not been determined yet.

Virus threat mandates legislation

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network and the Advanced Research Projects Agency Network last November, *still* has not been indicted for any crime. The U.S. Attorney's Office for the U.S. District Court in Syracuse, N.Y., which is investigating the case along with the Federal Bureau of Investigation, wouldn't comment on whether an indictment is forthcoming. But FBI sources close to the case say there may not be enough evidence to prosecute Morris under the current law.

When the 101st Congress reconvened in Washington, D.C. on Jan. 2, Rep. Wally Herger introduced a revised version of his Computer Virus Eradication Act.

The bill provides criminal penalties of up to 10 years in prison and commensurate fines for introducing a computer virus into a computer system or software owned by another individual without that individual's knowledge or consent. It also calls for civil penalties so that injured parties can recover damages from the perpetrator.

The bill was first introduced last May, but since it was late in the session, it was never reviewed by the Judiciary Committee. The bill has a very eager cosponsor in Rep. Robert Carr (D-Mich.). Last year, Carr's Washington office was victimized by a computer virus.

No one expects that a bill can stamp out computer viruses. However, this is the first piece of legislation that makes the writing of a computer virus a crime punishable by imprisonment and fines. And it may make would-be virus writers think twice before inserting damaging software code into someone's system. As such, it's at least a step in the right direction.

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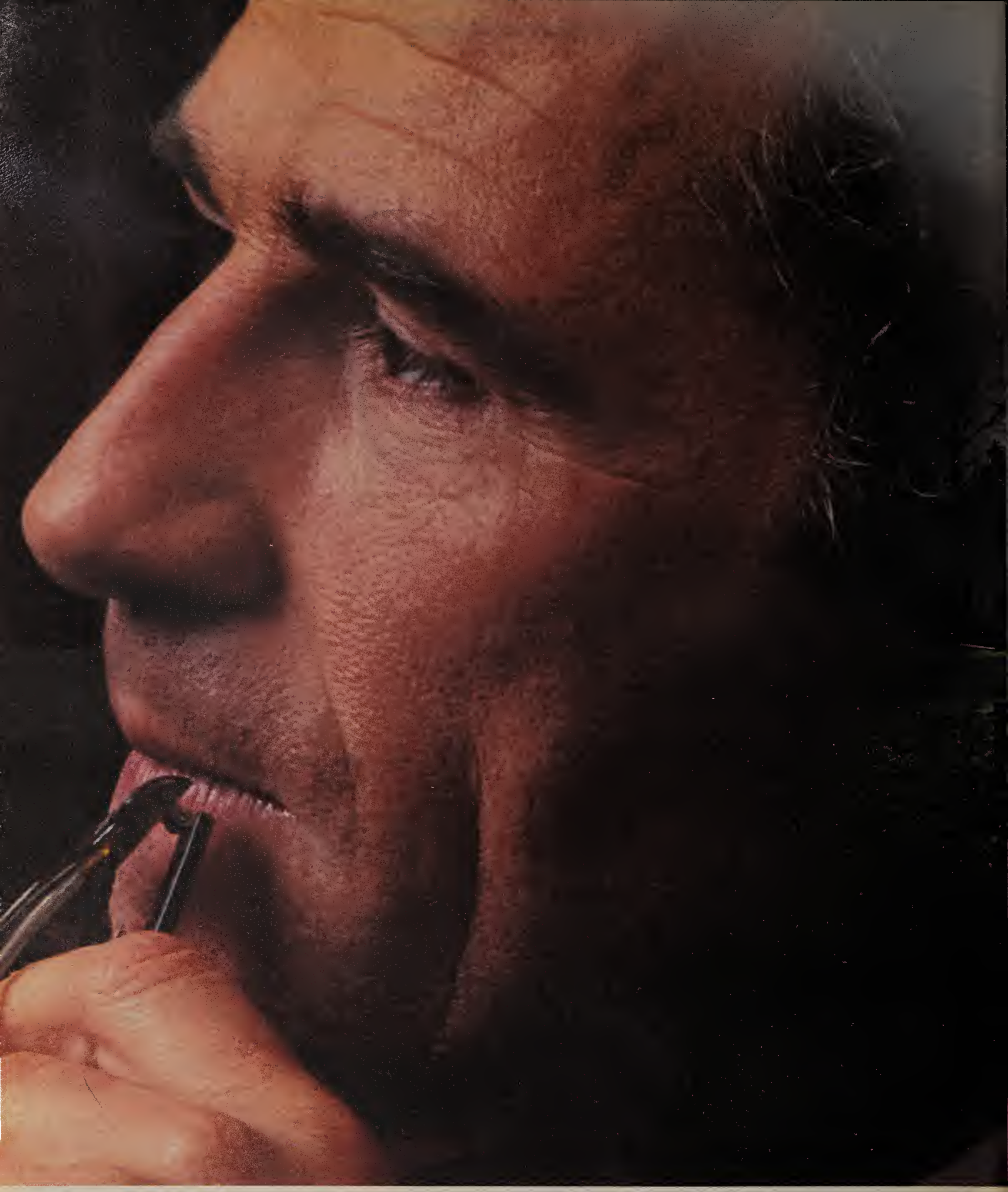

"Our college needed to enter the Information Age. But we weren't sure we could afford the price of admission."

For an educational institution, nothing is more important than the smooth exchange of information. That's why many colleges are making information networking a top priority.

The toughest challenge is connectivity. Colleges and universities, like most places, acquire computers and telecommunications hardware in patchwork fashion, ending up with little or no compatibility.

For one northeast college, AT&T Network Systems, working with the local telephone company, demonstrated that ISDN was the solution. Their information services manager explained: "ISDN gave us the best capabilities for the least cost. And we didn't have to trash our existing systems."

With central office-based ISDN, ordinary phone lines become the links in a fully interactive network. This translates into many applications and benefits. Voice and data can be transmitted simultaneously. For example, students and professors can confer with the Dean, who has on-line access to student records. Electronic mail streamlines internal communication, so course enrollment changes can be posted immediately. PC/terminal access to host computers and electronic file transfer extend every user's access to sophisticated software and multiple databases.

As the college's IS manager puts it: "ISDN can revolutionize the education experience. It's going to make us a better college. And, bottom line, a more competitive college."

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The right choice.

Novell, Apple pitch open protocol link

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ent adapters simultaneously, Novell said.

Products built to the OLI specifications will give users greater flexibility in building networks because they will not have to worry about matching the right boards with the right protocols.

In effect, OLI creates a standard network interface so that a vendor's networking software has to support only one generic driver for network adapters.

"By supporting this single interface, Proteon [Inc.] gains the ability to access a number of popular network protocols as well as any future protocol that Novell plans to support," said Nathan Kalowski, Proteon's vice-president of marketing.

According to Gary Frankel, a local network testing specialist at Martin Marietta Data Systems in Bethesda, Md., the elimination of hardware-specific software drivers will make networks easier to install and will facilitate the local network upgrade process. "This won't let you do anything you can't already do; it just makes it easier," Frankel said.

The benefits of streamlining the network interface process will likely aid network administrators and other information systems professionals; however, the change will probably go unnoticed by the typical user at a workstation, he said.

Some vendors said users, in certain cases, will come into contact with OLI. Polygon, Inc., for example, has developed DOS-based terminal emulation software called LAT-NSO that enables personal computers on an Ethernet to communicate directly with a Digital Equipment Corp. VAX via DEC's Local Area Transport (LAT) protocol.

Currently, a workstation with a single Ethernet card has to be in either NetWare or LAT mode, and switching between the two is a cumbersome process. OLI will let the workstation run both the NetWare and LAT protocols simultaneously so that the user can hotkey between NetWare and VAX modes, according to Rich Redelfs, vice-president of sales and marketing at Polygon. LAT-NSO users will be able to select any OLI-compliant Ethernet card on the market.

Encouraging innovation

Novell officials hope OLI will help bring innovative new products to market sooner by freeing up programming resources that have previously been dedicated to writing device drivers. In addition, OLI will enable users to run a single protocol over a multivendor network, a feature that could help track network management data.

The introduction of OLI is being viewed by some as a reaction to Microsoft's open protocol strategy for OS/2 LAN Manager. Early last year, Microsoft said it would offer LAN Manager licensees a selection of standard network transport protocols with interchangeable hardware drivers.

Microsoft tapped Retix and Madge Networks Ltd. to provide the NETBIOS Extended User Interface-compatible and ISO Transport Class 4 protocol stacks, respectively, while Excelan, Inc. was chosen to develop the Transmission Control Protocol/Internet Protocol module.

Two of those companies, Retix and Excelan, have announced support for OLI as well.

"It's good to see Novell join the club and open up the NetWare architecture to support multiple protocol stacks underneath NetWare services," said Brad Sharek, a product line manager in the desktop products group at Excelan. "It will let the industry build gateway processes between [NetWare and LAN Manager] work groups using a standard set of protocols."

OLI grew out of an effort by both companies to create bidirectional gateways so their customers could swap data between AppleShare and NetWare networks.

Craig Burton, executive vice-president in charge of Novell's software products group, said OLI does not represent any capitulation on Novell's part with regard to network protocols.

"What people don't understand is that there is nothing sacred to us about [NetWare's native transport mechanisms]," Burton said. Rather, Novell wants to provide network services that are independent of both hardware and protocols.

GSA awards contract to Bell Atlantic

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mac because federal workers often had to compete with residential and business users for open circuits on the public network.

"WITS will give us a private net that will not be degraded by outside influences, like [the time people calling about] a Bruce Springsteen concert jammed phone lines and made it difficult to place calls," Patton said.

Agencies will receive customized billing information that will make it easier to manage communications budgets.

The ISDN features of the WITS network will enable federal employees to simultaneously hold conversations and transmit data using a single phone line. Previously, employees who wanted to collaborate on a project had to dial up two separate lines, one for voice and one for data.

Bell Atlantic is no stranger to ISDN networks. It is currently involved in implementing about 20 ISDN projects with various customers in its region.

According to Bobbie Scott, acting director for the Telecommunications Procurement Division at the GSA, Bell Atlantic was chosen to install the network because of technical and cost factors. She declined to comment further.

A BellSouth official said his company will closely examine the GSA's procurement process before it decides whether to appeal the decision.

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Top AT&T executive talks tough

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file at some point to argue that the whole industry has now moved to a competitive model and the issue of dominance doesn't relate," Nacchio said.

Until it can achieve such regulatory reforms, the company will compete as aggressively as possible through the tariff process. "When a customer says they have a unique need, we try to solve it," Nacchio said. AT&T may turn to Tariff 12 for as many as 200 large customers this year. "I'm going to file as many [Tariff 12 offers] as we need," he added.

Although competitors recognize AT&T's right to seek deregulation, Leon Kestenbaum, an attorney for US Sprint Communications Co., said US Sprint objects to AT&T trying to use Tariff 12 to deregulate itself before the commission can act.

AT&T says Tariff 12 is necessary to satisfy the unique requirements of large customers, Kestenbaum said. "If there is room for 200 Tariff 12 offers, then Tariff 12 is not describing a unique service."

Nacchio said AT&T continues to lose customers and market share because of overly restrictive regulation. The company recently lost a customer whose annual telecommunications expenditures total $7.5 million because of problems surrounding Tariff 15.

Nacchio claimed that AT&T is being undercut by competitors that offer services on an off-tariff basis. He also said the carrier is having difficulty designing custom corporate networks because of regulatory delays. A number of AT&T's Tariff 12 networks — custom-designed nets that integrate voice and data services — have been protested and are under investigation.

"All I know is, I'm losing [customers] faster than I can count them," Nacchio said. "It just can't keep going this way."

Nacchio said he is not asking for complete deregulation but rather a fair regulatory environment. "I'm not arguing that I ought to have 100% [of the market]," he said. "I'm only arguing that I have the right to go after it."

Nacchio said AT&T is not invincible, even though many perceive the company as the industry's dominant force.

"If everybody left us tomorrow, we'd be an interesting footnote in the history book," he said. "This could happen."

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Calendar

Jan. 30-31, Santa Clara, Calif. — IBM's Systems Application Architecture. Contact: Gen2 Ventures, 12930 Saratoga Ave., Saratoga, Calif. 95070; (408) 446-2277.

Jan. 30-Feb. 1, San Francisco — DEC Systems, Architectures & Networks. Contact: Information Engineering Institute, 5119-A Leesburg Pike, Falls Church, Va. 22041; (703) 370-8103.

Jan. 31-Feb. 3, Toronto — Computer Network Architecture & Protocols. Contact: John Valenti, Integrated Computer Systems, 5800 Hannum Ave., Culver City, Calif. 90231.

Feb. 1, New York — Communications Managers Association Business Meeting/Educational Session. Contact: CMA, Administrative Office, 40 Morristown Road, Bernardsville, N.J. 07924; (201) 766-3824.

Feb. 2-3, Boston — T1/T3 Networking. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015; (201) 478-5400.

Feb. 2-3, San Francisco — Fiber Optic LANs: Speedy and Robust. Contact: InfoLAN Seminar Series, P.O. Box 162323, Austin, Texas 78716; (800) 526-7469.

Feb. 6-8, Washington, D.C. — Communication Networks '89. Contact: Communication Networks, P.O. Box 9171, Framingham, Mass. 01701; (800) 225-4698.

Feb. 7-8, Las Vegas — Las Vegas Audiotext Convention/Expo. Contact: InfoText Magazine, P.O. Box 19740-155, Irvine, Calif. 92714; (714) 551-9179.

Feb. 7-10, Arlington, Va. — ICA Winter Seminar. Contact: International Communications Association, 12750 Merit Drive, Dallas, Texas 75251.

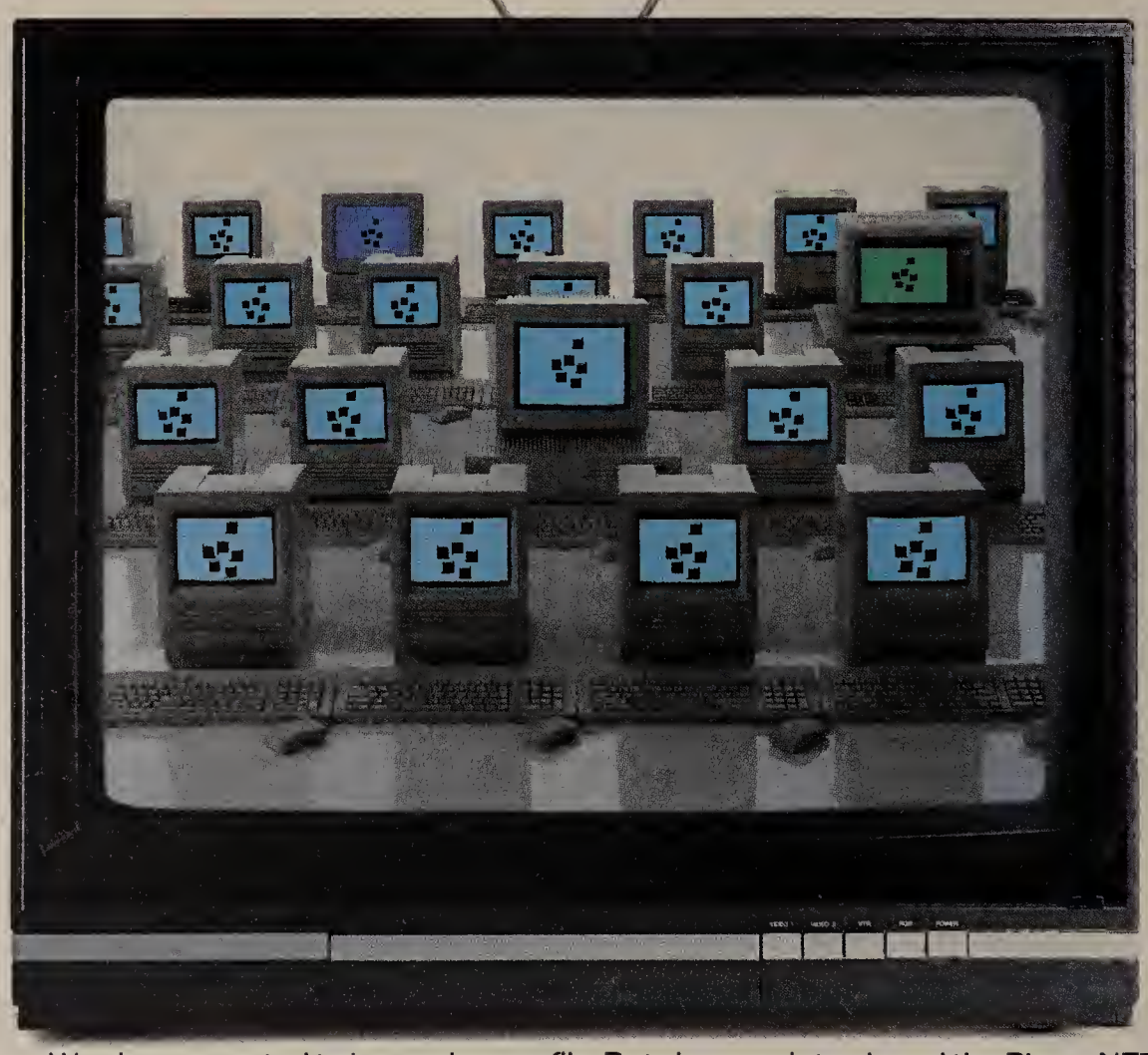
Feb. 8-10, New York — DEXPO East 89 Conference. Contact: Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540; (609) 987-9400.

Feb. 8-10, Orlando, Fla. — Selecting and Implementing Voice Messaging Systems. Contact: *Business Communications Review*, 950 York Road, Hinsdale, Ill. 60521; (800) 227-1234.

Feb. 12-15, New Orleans — TELECOM '89. Contact: American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036; (202) 663-5000.

Feb. 13-16, Dallas — James Martin World Seminars. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402; (213) 394-8305.

Network news.



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